

OPERATING BELOW CRUSH DEPTH: THE FORMATION, EVOLUTION,  
AND COLLAPSE OF THE IMPERIAL JAPANESE NAVY  
SUBMARINE FORCE IN WORLD WAR II

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Military History

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## ABSTRACT

OPERATING BELOW CRUSH DEPTH: THE FORMATION, EVOLUTION, AND COLLAPSE OF THE IMPERIAL JAPANESE SUBMARINE FORCE IN WORLD WAR II, by LCDR David W. Grogan, 140 pages.

Prior to entering World War II, the Japanese Navy did a considerable planning and force development in preparation for a single “decisive battle” with the American fleet. The Japanese submarine force entered the war with highly trained crews operating some of the most capable submarines in the world. Even so, they accomplished little. This study will analyze the genesis and evolution of the technological basis of the Japanese submarine fleet before and during the war. Along with the technological evolution, it will also review the strategic and tactical evolution of the force. It will further analyze the employment of submarines as they apply to two major forms of naval warfare: *guerre de course* and *guerre de main*. While the entire study will use comparison with the American and German, the majority of the focus will be on the unique aspects of the Japanese employment of their submarines. These analyses will answer whether the Japanese submarine force would have been capable of influencing the results of major battles and the overall campaign in the Pacific Ocean. Could the Japanese submarine force have influenced the result of the war allowing it to end with a more favorable outcome for the Japanese?

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## ACRONYMS

ADM	Admiral
CAPT	Captain
CDR	Commander
HMAS	Her Majesty's Australian Ship
HMS	Her Majesty's Ship
IJN	Imperial Japanese Navy
J	<i>Junsen</i> (Fleet)
KD	<i>Kai-dai</i> (Large)
KRS	<i>Kirai-Sen</i> (Mine-Layer)
KT	<i>Kai-Toku-Chi</i> (Special Subamrine, Medium)
LCDR	Lieutenant Commander
LT	Lieutenant
NM	Nautical Mile
RADM	Rear Admiral
ST	<i>Sen-Taka</i> (Submarine, High Speed)
STo	<i>Sen-Toku</i> (Special Submarine)
STS	<i>Sen-Taka-Sho</i> (Submarine, High Speed(Victory))
USS	United States Ship
VADM	Vice Admiral



## CHAPTER 1

### INTRODUCTION

On the night of Monday, 23 February, 1942, Imperial Japanese Navy Commander Kozo Nishino, in command of *I-17*, brought the boat to a halt in the Santa Barbara channel and ordered his crew to prepare for gun action. At 7:07 p.m., Nishino ordered his gun crew to open fire. Explosions went off on shore as 140mm shells hit the oil field. After a few minutes, Nishino had his gunners shift targets and continue the bombardment. At approximately 7:45 p.m., Nishino ordered cease-fire and the *I-17* started to transit to the south towards Los Angeles. The city of Ellwood, California had just become the site of the first attack on the United States mainland in World War II. *I-17*, a large, fast, ocean-going submarine, fired approximately 25 shells into two oil refineries and destroyed a derrick and a pump house. There was also damage to the Bankline pier and some private property.<sup>1</sup> CDR Nishino had finished providing fireworks in celebration of Washington's Birthday.<sup>2</sup> Much richer targets waited to the south.

Based on the ultimate result of World War II in the Pacific for Japan, and the lack of discussion of the Japanese submarine force in print, it would be very easy to say that the Japanese submarine force was ineffective in creating a significant impact on a strategic or operational level. This would do a great disservice to a proud and capable part of the Imperial Japanese Navy. Japanese submarines capable of ranging to the American

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<sup>1</sup>Bert Webber, *Silent Siege III-Japanese Attacks on North America in World War II-Ships Sunk, Air Raids, Bombs Dropped, Civilians Killed* (Medford, OR: Webb Research Group Press, 1997), 82-87.

<sup>2</sup>Washington's Birthday is February 22, but in 1942 it fell on a Sunday so the Federal Holiday was celebrated on Monday the 23rd.

West Coast represented a significant threat to merchant and military maritime traffic. They could carry observation planes for scouting, had long range (endurance), and were armed with dependable torpedoes. Advanced midget submarines that could conduct multiple raids inside harbors and return to their host submarine for further action also threatened Allied havens across the Pacific. The Imperial Japanese Navy coupled the technological prowess of its submarines to a stringent training program for the members of the submarine force. This provided the Imperial Japanese Navy with a weapon of distinct technological advantage crewed by tactically and technically sound sailors. When compared to the American Submarine Force, the German Submarine Force until 1942 and even the British Submarine Force, the Imperial Japanese (IJN) Submarine Force significantly underachieved in all aspects of operations even though they were generally considered by historians to be the most technologically advanced of all the submarine forces. If properly employed, could the Imperial Japanese Navy Submarine Force have slowed or even halted the American advance and caused significant reassignment of forces lengthening the war and potentially bringing it to a close on better terms for the Japanese?

### Literature Review

While books and other records are readily available for Allied and German submarine operations in World War II, there is palpable shortage of material concerning Japanese submarine operations. Japanese operations are covered by a small number of primary sources and peripherally in a number of secondary sources. Interwar considerations for Japan are lightly covered with the key source being David Evans and Mark Peattie's *Kaigun: Strategy, Tactics and Technology in the Imperial Japanese Navy*,

1887-1941.<sup>3</sup> Individual assessments of the Japanese response to various naval treaties during the interwar period will also be integral in analyzing this area.

Primary sources of significant interest are Zenji Orita's *I-Boat Captain*, Mochitsura Hashimoto's *Sunk: The Story of the Japanese Submarine Fleet, 1941-1945*. These works are autobiographical items from two Japanese fleet submarine commanders.<sup>4</sup> *Submarine Commander*, by Paul Schratz, also provides unique insight of Japanese submarines from an American submariner's perspective.<sup>5</sup> Naval technical reports from post-war prize exploitation along with ULTRA communication intercepts (accessed through secondary source material) should also provide significant insight into Japanese operational decisions and technical specifications.

Secondary sources will provide the majority of the technical data for a comparison of submarines from the various combatants. Emilio Bagnasco's *Submarines of World War Two* and Norman Polmar and Dorr Carpenter's *Submarines of the Imperial Japanese Navy 1904-1945* will provide the basis for the technical comparisons as well as some discussion of Japanese submarine design advancements during the interwar period.<sup>6</sup> These two works, in conjunction with Carl Boyd and Akihiko Yoshida's *The Japanese*

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<sup>3</sup>David Evans and Mark Peattie, *Kaigun: Strategy, Tactics and Technology in the Imperial Japanese Navy, 1887-1941* (Annapolis, MD: Naval Institute Press, 1997).

<sup>4</sup>Zenji Orita and Joseph Harrington, *I-Boat Captain* (Canoga Park, CA: Major Books, 1976); Mochitsura Hashimoto, *Sunk: The Story of the Japanese Submarine Fleet, 1941-1945* (New York: Henry Holt and Co, 1954).

<sup>5</sup>Paul Schratz, *Submarine Commander* (Lexington, KY: University Press of Kentucky, 1988).

<sup>6</sup>Emilio Bagnasco, *Submarines of World War Two* (Annapolis, MD: Naval Institute Press, 1973); Norman Polmar and Dorr Carpenter, *Submarines of the Imperial Japanese Navy, 1904-1945* (London: Conway Maritime Press Ltd, 1986).

*Submarine Force and World War II*, will also provide coverage of the operational employment of Japanese submarines.<sup>7</sup> Books such as Michael Gannon's *Operation Drumbeat* will provide the overview of German submarine operations on the United States' coastline that will provide a comparison for assessment of Japanese effectiveness in their long-range operations.<sup>8</sup> These books, in conjunction with Bert Webber's *Silent Siege III: Japanese Attacks on North America in World War II—Ships Sunk, Air Raids, Bombs Dropped, Civilians Killed*, will provide detail for comparison of attacks in coastal waters and United States' response.

The numerous biographical and autobiographical books on United States submarine commanders will provide the basis for a contemporary view of Japanese submarines. These patrol reports, in particular, will give keen insight into the actual tactics and operations of Japanese submarines encountered by Allied surface vessels and submarines and their evolution during the course of the war.

### Research Design

Initially the study will review the advances in Japanese submarine design during the interwar period. Part of this discussion will be a comparison to the advancements made in the United States, Great Britain and Germany. The progression of submarine design by Germany and the United States is clear as it led to vessels of the Type VII, Type IX, Gato and S-Classes. This review will be based upon performance related

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<sup>7</sup>Carl Boyd and Akihiko Yoshida, *The Japanese Submarine Force and World War II* (Annapolis, MD: Naval Institute Press, 1995).

<sup>8</sup>Michael Gannon, *Operation Drumbeat* (New York: Harper and Row Publishers, 1992).

characteristics such as speed, range, endurance, diving depth and submerged performance. These performance characteristics will be viewed within their ability to both influence a region of operations as well as a single engagement. This aspect of the study will assess the state of the Japanese submarine technology and its ability to influence combat operations. Numerous aspects of the design of these submarines shaped the capabilities that the Japanese Navy was able to employ in World War II. How did these design choices impact the usefulness of Japanese submarines? How did these design choices compare to those of their contemporaries? It will answer the question of what, if any, technological advantage did the IJN Submarine Force have before or during World War II compared to their contemporaries?

Further, the study will conduct an analysis of effectiveness of the Japanese submarine force in creating an impact on military operations in a broad comparison with that of the United States and Germany. Creating an impact on military operations will be considered as interactions that: deplete enemy capabilities (both combatant and merchant marine) through sinkings or damage; interdict the enemy flow of supplies (either strategic or tactical resources); or cause the diversion of significant resources to security operations that impact the ability to sustain the rate of offensive operations. This aspect of the study will review both results that could be reasonably expected from the intended employment of the Japanese submarines and the actual results attained by the Japanese submarines. Those results will also be reviewed in comparison to the German efforts in the Atlantic. This will answer the question of how did IJN strategy and tactics influence the IJN's utilization of the submarines at its disposal?

The study will also review the development of Japanese submarine tactics and their role within the overall war plan. This will include the planned usages of submarines in fleet and independent operations. The projected employment of Japanese submarines found its basis in many broad-ranging considerations from the Japanese experience gained in the Russo-Japanese War (1904-1905), their own anti-submarine operations in World War I and the German submarine operations in World War I. How did these examples influence the Japanese and how did Japan's intended employment compare to that of the United States and Germany? Then it will analyze the actual employment of Japanese submarines in all aspects of combat in World War II and their impact on Allied operations. Japanese submarines were involved in all aspects of combat operations from Pearl Harbor and Midway to the American West Coast and Guadalcanal. This analysis will consider both the technological and tactical aspects of their employment and the impact of these items on the effectiveness of the submarines. Independent operations along with coordinated operations will be the primary focus, but logistic and midget operations will also be considered in the overall evaluation. How did the operational employment of the Japanese submarines impact their effectiveness? Did the Japanese submarines perform within the vision of the overall war plan? This will answer the question of how did IJN strategy and tactics influence the IJN's utilization of the submarines at its disposal?

Finally, the study will review the advances in military technology and the evolution of Japanese submarine design and tactics over the course of World War II. Japanese submarines came to see more use in logistics support roles and independent operations as the war progressed. At the same time, Japanese submarine design drove the

evolution of dedicated supply submarines and smaller vessels with higher submerged speeds. The recoverable midget submarines gave way to clutches of kamikaze torpedoes. Did these technological adjustments increase the effectiveness of the Japanese submarine force? Were the adjustments in tactical employment appropriate to slow the advance of the United States' forces across the Pacific? This aspect of the study will answer the question of did the influence of further technological advances later in the war serve to attempt to change the course of the war or simply delay the inevitable?

The thesis consists of six chapters. The first chapter introduced the research question, a literary review and methodology discussion. Chapter 2 discusses the Japanese response to the interwar Naval Treaties, interwar tactical development and strategy and interwar Japanese submarine technological development and design advancements through 1941. Chapter 3 reviews Japanese submarine employment, both planned and executed, during the war up to and including Guadalcanal. Chapter 4 discusses the evolution of Japanese submarine design and tactics during the course of the war. Chapter 5 reviews Japanese submarine employment after Guadalcanal through the end of the war. Chapter 6 provides the conclusions and discussion of further research considerations.

## CHAPTER 2

### INTERWAR STRATEGIC AND TACTICAL DEVELOPMENT

#### Genesis of the Japanese Submarine Strategy

To understand the evolution of the submarine in the Japanese War Plan in the Pacific during the Interwar Period, one has to look back all the way to the initial forays of the Japanese into conflict at sea in the 20th century: the Sino-Japanese War and the Russo-Japanese War. Large battle-fleets engaged in traditional force-on-force battles that concluded within hours and did not require consistent attacks against any of the infrastructure of their opponent. The desire to build a submarine force was born in the Russo-Japanese War as the Japanese Naval Staff saw them as potentially useful assets for blockading and blockade running while there was no consideration of their use in operations on the open seas.<sup>9</sup>

Japanese participation in World War I further solidified the Japanese view of submarines in naval combat. The Japanese focused most of their attention on the large surface action of the Battle of Jutland. Again, the Japanese Naval Staff observed the decisive fleet actions as the key to success within the overall naval campaign in a war. While there was this focus, the observers did take note of the influence of the submarine threat on the tactics applied within the Battle of Jutland.<sup>10</sup> While observing the surface fleet operations in the World War I, they also participated in anti-submarine operations and convoy escort duties within the Pacific and Indian Oceans predominantly with later

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<sup>9</sup>Evans and Peattie, 177.

<sup>10</sup>Boyd and Yoshida, 6.



operations even occurring in the Mediterranean Sea.<sup>11</sup> However, they experienced the challenge of anti-submarine operations and the risk that submarines presented to the seaborne lines of communication. They still used the experiences of the major surface clashes such as the Battles of the Tsushima Straits and Jutland as the penultimate form of the naval warfare and the key to control of the seas.

As the Japanese built their submarine force, their initial vision was for a force that was capable of both commerce raiding and engagement of the enemy's major combatants. The small size of the Japanese submarine force at the time did not allow this vision of dual capability to come to fruition.<sup>12</sup> Given the inability to meet this initial vision, the basic Japanese submarine strategy centered on attacking enemy combatants. The Japanese Naval Staff viewed anything other than the force-on-force fleet engagement as unglamorous and relegated them to a secondary position in their overall naval strategy.<sup>13</sup>

Before further discussion of the Japanese submarine strategy, the Japanese strategy for war within the Pacific needs clarification. As previously discussed, the Japanese viewed the large surface fleet engagement as the decisive point in naval combat. The Naval General Staff fixated on forcing and winning this —decisive battle.”<sup>14</sup> The Naval General Staff viewed the single decisive battle as key to success in a war with the United States because they desired a short war. They hoped to cripple the combat power

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<sup>11</sup>Evans and Peattie, 169.

<sup>12</sup>Boyd and Yoshida, 5.

<sup>13</sup>Evans and Peattie, 169-170.

<sup>14</sup>Ibid., 217.

of the United States in the Pacific before more units could transfer to the theater. The short war also sought to avoid the engagement of the large industrial base of the United States in a “production war” that the Japanese could not hope to win.<sup>15</sup> Japanese strategy relied on the inability of the American production base to convert to a wartime footing before adverse public sentiment forced the United States to sue for peace. Clearly, the lessons learned from the Battles of the Tsushima Straits and Jutland heavily influenced the Japanese strategy.

### Architect of the Submarine Strategy

The commander of the First Submarine Squadron, then-Rear Admiral (RAdm) Nobumasa Suetsugu, undertook the task of shaping the involvement of the Japanese submarine force in the overall Japanese strategy. Suetsugu was a Japanese naval observer during World War I, and as a gunnery officer had no practical submarine experience of his own.<sup>16</sup> Known for radical views with respect to war, he viewed war with China and later with the United States as a means to an end without consideration of the ultimate ramifications. When asked if the Navy was preparing for war with the United States, he responded, “certainly, even that is acceptable if it will get us a budget.” Suetsugu proposed a strategy of attrition for the submarine force with the ultimate goal of 30%

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<sup>15</sup>Ibid., 399.

<sup>16</sup>Ibid., 214. At the time that the Admiral commanded the First Submarine Squadron, it was the senior submarine command and he thus stood as the commander of all Japanese submarines responsible for their operations, training and tactics. Admiral Suetsugu served in numerous influential posts during his career including command of the First Submarine Squadron (1923), head of the Operations Planning Section of the Navy General Staff (1923-25), Commander in Chief of the Combined Fleet (1933-34), and minister of home affairs in the First Konoe Cabinet (1937-39).

attrition of enemy combatant power prior to the decisive battle.<sup>17</sup> He viewed the submarine force as the “best hope of shredding American capital ship superiority” and creating more favorable odds to generate the desired short war. The Admiral was fiercely protective of his strategic view and regularly removed submarine commanders and veterans who disagreed with him.<sup>18</sup>

It is important to understand that the Japanese Navy was organized into two major groups: “administrative” and “command.” Classification into a group depended on the experience of each officer based on assignments in either the Navy Ministry or Naval General Staff early in their career. As such, an broadly experienced officer such as Admiral Yamamoto was classified as an “administrative” officer based on his billets within the Navy Ministry whereas the less broadly experienced Suetsugu was a “command” group member based on his staff assignments. The division of the officers to these two groups led to feelings of inferiority amongst the “command” group members as the “administrative” group was considered the elite. The “administrative” group was the political officers while the “command” group was the operators. As the Japanese Navy dealt with the era of naval treaties, the division between these groups manifested itself into the disputes between the Fleet Faction and the Treaty Faction. The basis for the division was the acceptance or abrogation of the treaties and each group’s view of relations with the United States. The Treaty Faction preferred operating within the treaty constraints and mollifying the United States while the Fleet Faction was uninterested in restricting itself under the treaties and did not care about potentially provoking a response

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<sup>17</sup>Boyd and Yoshida, 6-7.

<sup>18</sup>Evans and Peattie, 214.

from the United States. Suetsugu, as evidenced by some of his previously mentioned comments, would prove to be a leading member of the Fleet Faction. He was a leader within the “command” group and he would ultimately wield strong influence over most junior officers because of his emotional and patriotic stance in support of a strong navy and state.<sup>19</sup>

The initial step in the employment of submarines laid out by Suetsugu in 1923 consisted of surveillance and reconnaissance operations, minelaying and early warning duties working in conjunction with the Fleet to destroy the US Asiatic Fleet to rid the Japanese of their nearest threat before pressing to the decisive battle. The goal of this strategy was to extend the American lines of communication by depriving them of advance bases in the Philippines, Guam and Hawaii.<sup>20</sup> There was no expectation in this plan of the submarines carrying out direct action against the American forces. Once the Asiatic Fleet forces were defeated, the focus of the fleet shifted to the American Pacific fleet and movement towards the final decisive battle. Again, the plan relegated the submarines to work mainly as scouting elements for the *zengen sakusen* or “Progressive Reduction Operations.” The task of the submarines included observing American naval bases and reporting on the departure of the battle fleet. As the battle fleet crossed the Pacific from Hawaii to the Bonin-Marianas line, the submarines were to provide position reports to allow the main Japanese force to achieve the optimum position before engagement. The submarines would also operate in conjunction with other Japanese light

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<sup>19</sup>Asada, 164-6.

<sup>20</sup>Polmar and Carpenter and Carpenter, 1; Evans and Peattie, 202-203.

forces to attrite the American combatant power on their transit.<sup>21</sup> This attrition would consist of numerous scouting lines of submarines arrayed across the expected path of the American fleet. As the American fleet passed each line (each of which was composed of an entire squadron of ten submarines), the lines would collapse towards the fleet for opportunistic attacks and then follow along in the transit west to the decisive battle.<sup>22</sup>

As Suetsugu moved from the position as commander of the First Submarine Squadron to the head of the Operations Planning Section of the Navy General Staff, he gained greater influence on the role of submarines in the overall strategy. The strategy evolved as the planners realized that the submarines were going to have the most contact with the enemy over the prolonged period of the trans-Pacific crossing.<sup>23</sup> The attrition strategy that developed required significant improvements to submarines and their weapons that will be discussed later. Suetsugu and others recognized the advantage gained by coordinating the submarines with patrol plane operations. Plans called for using submarines to act as “refueling stations” for patrol planes to extend their surveillance capabilities while small planes were envisioned for operation from submarines to improve the organic intelligence capability and increase their effectiveness.<sup>24</sup> The

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<sup>21</sup>Evans and Peattie, 204.

<sup>22</sup>Orita and Harrington, 18; Evans and Peattie, 219. Zenji Orita, then executive officer of the I-15, in Submarine Squadron One of the Japanese Sixth Fleet described the strategy as requiring all three squadrons (30 boats) of the 6th Fleet for execution with Submarine Squadron One being the easternmost arrayed in a north-south line. Squadron Two and Three would be arrayed similarly in north-south lines with Two in the center and Three being the westernmost.

<sup>23</sup>Boyd and Yoshida, 4.

<sup>24</sup>Evans and Peattie, 218.

coordination efforts with aircraft greatly increased the area of the ocean patrolled by the submarines. The aircraft would identify targets for follow-on attack by the host submarine. This aircraft-submarine cooperation also might increase the safety factor for the submarines by allowing them to identify threats and avoid them. A further addition to the strategy was the inclusion of midget submarines. The midgets held the role of a containment force during the ~~decisive~~ "decisive battle" by deploying from the host submarines and encircling the major combatants along with their hosts and the various light craft involved.<sup>25</sup> The midgets were to conduct attacks of opportunity in order to keep the American battle force in a small area of operations to force the engagement with the main Japanese Fleet.

As Suetsugu moved further up the hierarchy of the Navy Staff into the role of Commander in Chief of the Combined Fleet, he continued to influence the shaping of the overall fleet battle plan. This plan evolved and solidified as relations between Japan and the United States deteriorated in the 1930s. The prescribed area for the conduct of the ~~decisive~~ "decisive battle" moved further and further east. Initially this area fell near the Ryukyus island chain and then moved out to the Bonin-Marianas island chain. The final position of the ~~decisive~~ "decisive battle" in the Japanese plan was east of the Marshalls island chain.<sup>26</sup> This coincided with the American Orange Plan that called for a concerted advance to take the Marshalls island chain, specifically Eniwetok located in the northern part of the chain. The arrival at a coincident point of a major naval battle is likely due to compromise of

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<sup>25</sup>Ibid., 272-3, 282.

<sup>26</sup>Ibid., 291.

part of Plan Orange coupled with the similar strategic basis for both navies planning.<sup>27</sup> The movement of the decisive battle did not account for the supply and support assets necessary for the Japanese to conduct this battle at a greater distance from the Home Islands. The General Battle Instructions of 1934 directed that submarines operate in order to weaken the enemy main force in either individual or coordinated attacks while the Operational Plan of 1935 directed other submarine assets to Hawaii and the west coast of the United States to conduct attacks against American Naval vessels.<sup>28</sup> The overall plan and specific instructions to the commanders changed minimally until just before the war. All planning continued to focus on a “decisive battle” far from the Home Islands that would allow the Japanese Fleet to sweep the American battle force from the seas and gain full operational freedom in the Pacific.

While the majority of submarine planning focused solely on the supporting role of the force to drive the American battle force to the “decisive battle,” commerce raiding, or *guerre de course*,<sup>29</sup> was not ignored. As previously noted, the goal of the submarine force from its inception was to conduct combatant attacks as well as commerce raiding. The

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<sup>27</sup>Miller, 108; Evans and Peattie, 472. Both the American and Japanese navies, along with most around the world, were disciples of Mahanian strategy that focused on large naval battle amongst massed combat forces. Eniwetok, in the Marshall Islands, became a major part of the Orange Plan because of its large, deep protected anchorage and sufficient land area for air basing to continue attacks into the Marianas Islands and on to the Home Islands. Eniwetok also was close enough to conduct attacks on the major Japanese bastion of Truk. At the same time Eniwetok was far enough away to allow US forces to build and organize for follow-on operations without significant harassment. The Japanese viewed the Marshalls as important for the staging capability and air basing facilities that could be laid out to provide a significant defensive infrastructure.

<sup>28</sup>Boyd and Yoshida, 4-5; Evans and Peattie, 291.

<sup>29</sup>Traditional naval strategy fell into two distinct categories: fleet on fleet efforts or *guerre d’esquadron* and force on merchants (commerce raiding) or *guerre de course*.

Japanese saw firsthand while escorting convoys in World War I that the submarines could have an overwhelming impact on the conduct of a war. The effectiveness of the German U-boat fleet greatly impressed the Japanese, but they remained more enamored of the large fleet battle and viewed the commerce raiding as “~~u~~glamorous.” However, the commanders were free to conduct commerce raiding provided it did not interfere with higher priority actions and only “~~w~~hen the fighting strength of the fleet allowed.”<sup>30</sup>

As the plan developed during the interwar period, the relegation of commerce raiding to a secondary effort solidified for a handful of reasons. The Japanese Navy General Staff felt that commerce raiding was an ineffective assignment of assets within the confines of the “~~s~~hort war” plan.<sup>31</sup> With the thought that the war would be short due to the single-minded focus on the idea of a “~~d~~ecisive battle,” submarines committed to commerce raiding would not be available to attrite the American Battle fleet and would influence the balance of the “~~d~~ecisive battle.” This negative view is interesting considering that commerce raiding is a strategy of attrition not too different from the attritional ideas espoused in the overall Japanese strategy. As planning continued and commerce raiding persisted on the periphery of the discussion, commerce raiding fell further from favor. This was due to the belief that significant commerce raiding would divert American forces away from the “~~d~~ecisive battle” thereby lessening the finality of the battle that the Japanese were hoping to conduct.<sup>32</sup>

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<sup>30</sup>Evans and Peattie, 169; Hashimoto, 62.

<sup>31</sup>Evans and Peattie, 217.

<sup>32</sup>Ibid., 218.



By the beginning of 1940, as war drew near, the Japanese had settled on a war plan that centered on a single major sea battle where the submarines held an important, but ancillary role. Initially the submarines would provide cueing as the American battle force left port. During the transit to the intended area of the penultimate battle, the submarines would attempt to weaken the battle force. Finally, once in place for the final battle, the submarines, along with midgets and other light forces would act to corral the combatants and maintain the opposing fleet within striking range of the Japanese main force. Commerce raiding was to be conducted only as a final act when no military targets were available and no other services were needed of the submarines.

#### Development of Submarine Technology during the Interwar Period

A concentrated focus on improvement of Japanese submarines and weapons systems began as the overall war plan started to expand in the mid to late 1920s. The submarines available in the Navy during the 1920s consisted of short-range vessels incapable of operating far from the Home Islands and only capable of defensive positioning.<sup>33</sup> All the submarines at this time would be most definable as coastal or patrol type submarines incapable of significant offensive operations. As of 1924, after the signing of the Washington Naval Treaty, the Japanese submarine force consisted of only one 1<sup>st</sup> class (Large) submarine of 2,400 tons, 39 2nd class (Medium) submarines averaging just over 1,000 tons and 10 3rd class (Small) submarines of little more than 400 tons on average.<sup>34</sup> The single 1st class submarine was the only one capable of long

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<sup>33</sup>Evans and Peattie, 213.

<sup>34</sup>Polmar and Carpenter and Carpenter, 1. For technical discussion in this section, all displacements used are submerged *normal* displacements as defined in the London

range operations while the 2nd and 3rd classes were only capable of limited ocean-going patrols and coastal/training roles respectively.

The submarine force consisted of vessels or designs bought from the British or French, but a significant technological boost arrived in the form of seven U-Boats provided as war reparations from Germany at the end of World War I. The Japanese Navy combined this infusion of German technology with a more dedicated focus on building a capable design and construction infrastructure in the country that was independent of foreign support. To aid in this goal, the Japanese engaged the German submarine experts and brought numerous German citizens to Japan to teach submarine design and construction and to oversee the building of the appropriate industry infrastructure. The influx of foreign talent led to that lone 1<sup>st</sup> class submarine previously mentioned, the KD1 Type,<sup>35</sup> which boasted a cruising range of greater than 20,000 miles while the other submarines in Japanese service could only travel 6000 miles. A single KD2 Type submarine (with a 10,000-mile range) followed the single KD1 Type submarine, and both conducted extensive testing and evaluation of submarine roles and

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Naval Treaty: fully equipped and ready for sea with one quarter fuel, one half stores/provisions and one half supply of ammunition. Japanese submarine will be referred to by type, or class, and only by specific hull number when pertinent. When the hull number is used, owing to the Japanese renumbering scheme during the war, only the final hull number of the vessel will be used to avoid confusion vice using the appropriate number for the time that is being discussed.

<sup>35</sup>Bagnasco, 172. Japanese submarine types were referred to by a two or three letter abbreviation of the descriptor of the class. As such, KD stood for *Kai-dai* meaning Large or Fleet-type while J stood for *Junsen* meaning Cruiser. Other class codes were KRS for *Kirai-Sen* meaning Mine-Layer, KT for *Kai-Toku-Chu* meaning Medium, Special Submarine, ST for *Sen-Taka* meaning Submarine, High speed, STo for *Sen Toku* meaning Special Submarine. Some of the classes defied this convention, specifically the A, B, C, and D classes.

capabilities.<sup>36</sup> With such a short range for the vast majority of operational submarines, the Japanese could only influence surface fleet actions near the Philippines and Guam without having forward bases for operations.

When German technical assistance to Japan was at its peak at the end of 1920, over 800 foreign technicians, scientists, engineers and submarine officers were active in the effort. Even with this large number of German experts operating within the Japanese development team, the vessel designs quickly diverged from the German standard design. The KD2 was a derivative of the German Type *U-139* long-range “U-Cruisers” with increased maximum surface speed (22 knots versus 15.8 for the *U-139*) to allow the vessel to operate in conjunction with a fleet in accordance with Japanese strategy.<sup>37</sup> This key alteration of the design significantly changed the method of operation of the “U-Cruisers” which were designed to conduct independent attacks and commerce raiding. Across the breadth of the technical mission to Japan, the experience lay in smaller submarines designed for commerce raiding and convoy attacks. Even with the weight of this experience, Japanese design plans continued to push for larger vessels for attacks against combatants. In fact, only one of the reparations submarines led to a change in the Japanese submarine building plan. The *UB-125* was a rarity amongst the German submarines. Like large submarine “U-Cruisers,” the *UB-125* was a submarine with a significant displacement that mounted a number of vertical mine tubes. This led to the KRS Type of mine-laying submarines.<sup>38</sup> While the unique capability of this class was an

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<sup>36</sup>Evans and Peattie, 215.

<sup>37</sup>Boyd and Yoshida, 13-14, 16-17.

<sup>38</sup>Boyd and Yoshida, 18; Polmar and Carpenter, 89.

addition to the Japanese plan, the experience of building a class of large submarines contributed to the further advancement of the Japanese submarine building effort.

With the initial plan of operations presented by Admiral Suetsugu in 1923 calling for surveillance and early warning duties for the surface forces mixed with mining to deny key ports and transit routes in the Southwest Pacific, the Japanese embarked on a series of building programs prior to World War II. Involving marked increases in range, speed and displacement to meet the requirements of Suetsugu's plan and its continuing evolution that included the significant eastward movement previously discussed the building programs focused on rapidly replacing the aging boats within the force. The vessels built during the 1922 Program took longer to build than those included in previous programs based on the larger size of the units and design modifications caused by Suetsugu's strategic vision. Besides bringing about the construction of the previously mentioned KRS Type minelayers, the 1922 Program also included the J1M Type scouting submarine.

The J1M Type submarine represented another significant technological step within the Japanese submarine force with the inclusion of scouting aircraft. The Japanese built the Type J1M submarine with a catapult and hangar facilities to carry a Yokosuka E14Y ~~–GLEN~~ scouting plane.<sup>39</sup> The inclusion of a scout plane significantly increased the ability of the submarine to operate in the surveillance and early-warning roles. The scout plane increased the area of ocean that the submarines could search. The normal

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<sup>39</sup>Boyd and Yoshida 20-21. While Watanabe E9W1 ~~–SLIM~~ biplane was the initial plane embarked, the Yokosuka E14Y ~~–GLEN~~ became the normal scout plane carried aboard all submarines in the summer of 1941. While the ~~–SLIM~~ did see some operational activity, they were relegated to a training role by the end of 1942.

search area of a submarine is dependent on the height of eye of the periscope. When running on the surface, a Japanese submarine could see approximately 12,500yds to a clear horizon and identify a large warship at nearly 28,000yds. Remaining stationary, the submarine therefore could view an area of nearly 620 square nautical miles. Thus, a submarine could nominally search 6000 square nautical miles per day. The scout plane increases the area of coverage by over 23,000 miles.<sup>40</sup> The only drawback to the use of the scout plane would be the significant amount of time required to unstow, prepare and launch the aircraft (or conversely recover and stow). During these periods, which could be as short as 15 minutes but averaged 30 minutes, the host submarine was at significant risk of detection and destruction.<sup>41</sup> No Allied submarines had the added capability of a scout plane even though Great Britain, France and the United States experimented with the concept. Their search capability was limited to the periscope and, later in the war, radar and radio direction finding (RDF) equipment.

Sandwiched between the KD1 and KD2 Type submarines that were a significant step forward in range, speed and size came a small submarine with a further capability advance: large torpedo tubes. The K4 Type Fleet Submarine, which entered service in

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<sup>40</sup>Range of vision is determined using the distance to horizon formula ( $2.288 \times \text{square root of height of eye} = \text{distance to horizon in thousands of yards}$ ). A nominal height of eye of 30 feet for a the periscope of a surfaced submarine was used while a nominal masthead height of 75 feet was used for the large warship target (with 33 percent visible for classification). Total search area assumed 12 hours on the surface each day at a speed of 16 knots. Submerged search ranges were considered negligible. The scout aircraft assumes forty nautical miles of visibility and a 475 nautical mile range.

<sup>41</sup>Polmar and Carpenter and Carpenter, 6. Common practice was for the submarine to recover the pilot and scuttle the plane to minimize the exposure on the surface if the plane had conducted a flight of strategic intelligence value thereby allowing the submarine to depart immediately to return home with the intelligence from the flight.

1924, was the first in Japanese service to have 21-inch diameter torpedo tubes instead of the customary 18-inch tubes.<sup>42</sup> The introduction of 21-inch torpedo tubes allowed for larger torpedoes with longer range, higher speed and larger warheads. The larger tubes also brought the modification of the highly successful Type 93 Long Lance torpedo for submarine use in 1933. The modified Long Lance was re-designated the Type 95 torpedo in submarine service and provided a torpedo with a speed of 48kts (approximately 55mph) and a range of over 7 miles. More important than these significant statistics was the fact that the Type 95 was an oxygen torpedo that was “wakeless.” This meant that it did not leave a distinctive trail of bubbles along its path of travel that would reveal the location of the launching unit. The Japanese pursued this technology and perfected it because they mistakenly believed the British were significantly advanced in testing it. The British, in fact, stopped their efforts and the United States believed that oxygen torpedoes as a whole were unworkable.<sup>43</sup> The Allies relied on traditional steam torpedoes that had xxx range and speed. The Long Lance thus provided Japanese submarine force with a significantly larger engagement envelope than Allied submarines.

All of the advances in speed, size, range and armament with the inclusion of scouting aircraft, led to the continued improvement of the *Junsen* and *Kaidai* types of submarines that were optimized for independent operations and fleet support respectively. With ranges besting 15,000 nautical miles and surface speeds in excess of 20 kts, these vessels provided significant capabilities while conducting 2 month at sea

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<sup>42</sup>Ibid., 82. 18 inch torpedoes remained in use within the submarine force as the armament on Type A midget submarines due to size constraints.

<sup>43</sup>Evans and Peattie, 266-7, 270.

patrol periods.<sup>44</sup> Continuing advances led to the penultimate classes of submarines prior to the outbreak of hostilities. These three classes were named the A, B, and C classes which were Headquarters, Scouting and Attack submarines respectively. This combination of boats was expected to provide a highly capable team of vessels where the A coordinated the scouting of the attached Bs that enabled the attacks of the attached Cs.<sup>45</sup> The Type A Headquarters submarines had additional communications systems for command and control duties as well as a scout plane. Maximum range was 16,000 nautical miles at 16 knots with a load of 18 torpedoes at a displacement of 2919 tons. Maximum surface speed was 23.5 knots. The Type B Scouting submarines carried a scout plane. Maximum range was 14000 nautical miles at 16 knots with a load of 17 torpedoes at a displacement of 2589 tons. Maximum surface speed was 23.6 knots. The Type C Attack submarines dispatched with the scouting plane. While lacking the scout plane, the Type C submarines did have the capability to carry a Type A midget submarine on deck forward of the sail. Maximum range was 14000 nautical miles at 16 knots with a load of 20 torpedoes at a displacement of 2554 tons. Maximum surface speed was 23.6 knots. At the outbreak of the war, Japan had fourteen of these three classes (A-two, B-seven, C-five) and they would be the basis for numerous variations throughout the war.<sup>46</sup>

By the beginning of the war, the Japanese had nearly 60 highly capable 1<sup>st</sup> and 2<sup>nd</sup> class submarines in the fleet. The majority of the submarines possessed an operating

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<sup>44</sup>Boyd and Yoshida, 18; Evans and Peattie, 216-7.

<sup>45</sup>In actuality, these combined operations groups never came to fruition as envisioned but that will be covered in more detail later.

<sup>46</sup>Bagnasco, 188-192.

range that allowed excursions to the US West Coast while carrying highly capable, long-range “wakeless” torpedoes. Some even carried scout planes to increase their effective area of operations. While these vessels ultimately were extremely capable, especially in comparison to their Allied counterparts, the most capable were not available in significant numbers at the outbreak of the war. The continuing focus on air and surface forces maintained the low building rate of submarines and slowed the ultimate replacement of vessels of lesser capability.

#### Development of Tactics and Training during the Interwar Period

The requirements of the overall strategy drove the training and tactics development of the interwar period. Detailed tactical development in support of the overall plan did not start until the late 1930s. Up until that point, Japanese submarine training consisted of rigid repetition of basic submarine skills of diving, surfacing, shiphandling (a point of pride of all members of the Imperial Japanese Navy) and basic weapons employment. The first major focused training in support of the “decisive battle” plan did not occur until a series of exercises in 1938. These exercises focused on attacks against combatant vessels. The result of these exercises showed that the submarine force was highly ineffective at this type of employment.<sup>47</sup> This however did not immediately deter the force from the plan or influence the overall view of the Navy General Staff concerning the goal of a decisive battle.

In view of these results, the Navy developed relatively restrictive tactics for submarines in accordance with the overall goal of a single decisive battle to end the war.

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<sup>47</sup>Evans and Peattie, 428.



The plan directed submarines to focus their attacks against warships to degrade the American combat power. The prime targets amongst the warships were inevitably the battleships and aircraft carriers which the Japanese expected to find at the middle of the American formations. The Japanese expected the Americans to use a formation known as the “Ring Formation” which consisted of successive layers (or rings) of warships starting with destroyers and small vessels in the outmost ring. Inside the destroyer ring would be a ring of light cruisers that in turn surrounded a ring of heavy cruisers. Inside this ring was the massed group of battleships and aircraft carriers where the battleships formed the innermost ring of protection. With this formation in mind, the Japanese submariners developed tactics to penetrate these screens such that they only expended torpedoes against the prime targets.<sup>48</sup> Coupled with the development of methods to penetrate screens, the submarine force also promulgated guidance concerning the required number of torpedoes for use against each type of target

The overall plan for the decisive battle also called for submarines to perform a previously unexpected role of surveillance of enemy bases that required previously undeveloped skills. At no point prior to the 1930s, had the submarine force considered developing the required skill set necessary to conduct effective surveillance of an enemy port to detect a departing enemy battle force. As exercises were conducted in 1939 and 1940, it became obvious that the effort already expended in this area was insufficient as extended surveillance of enemy bases was much more difficult than initially envisioned.<sup>49</sup>

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<sup>48</sup>Orita and Harrington, 46.

<sup>49</sup>Evans and Peattie, 428-9.

As such, the learning curve became very steep, as the submarine force was required to develop another tactical skill in a short period.

Linked with the requirement to provide long-term surveillance of enemy ports was the necessity to form and coordinate picket lines of submarines to monitor the advance of the enemy battle force. Further complicating the employment of the submarines in picket lines was the desire to have them collapse en masse on the enemy force as it advanced in order to have a better chance for significant attrition of the enemy battle force. The determination of the battle force's route of travel and the selection of appropriate point for convergence of the battle line was a complicated process that the submarine force had to develop appropriate communication procedures and navigation accuracy and coordination to exploit. This challenged the force with further training requirements prior to the start of the war.<sup>50</sup>

While training increased significantly with all of the new roles and tasks for the submarine force to perfect in their part of the “decisive battle” plan, there was little consideration of commerce raiding and an offensive against the enemy lines of communication. There was discussion of the role of commerce raiding in warfare, but since it was not significant within the Japanese interpretation of the strategy of Mahan, it was minimized within the training curricula of the various submarine training courses. In conjunction with the minimal inclusion in any training syllabus, the Japanese Navy failed to study commerce raiding in any major exercise except for one in October of 1940 that

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<sup>50</sup>Ibid., 219.

will be discussed later. As such, the skills required of submarines for commerce raiding did not appear amongst the long list of items on which the force focused.<sup>51</sup>

The submarine force, as the Japanese Navy as a whole, conducted extremely challenging training exercises during their preparation for war. The submarine force conducted training events in all conditions regardless of the risk to the crews and vessels. Their at sea exercises were at a significant counter to the view of the war-weary British whose exercises at the same time could be considered relatively simplistic and short.<sup>52</sup> The challenging exercises conducted by the Japanese took place in all parts of the Pacific Ocean from the Kuriles to the Mandated Islands, around Formosa and along the Japanese coast. The exercises were so intense and severe that the submarine sailors, in particular, would describe the conduct of actual wartime operations as easier than the exercises. During the course of twenty months of these exercises, the submarine force actually lost three vessels. *I-161* (collision with surface ship), *I-163* (collision with another submarine) and *I-167* (unknown cause) were all lost due to the Japanese focus on operations in all conditions.<sup>53</sup>

Despite the intensity of the Japanese training and the pursuit of necessary skills to conduct the “decisive battle” plan, the Japanese failed to test it in its entirety. Based on its complexity (requiring thirty submarines alone for the planned picket lines), wholesale testing of the plan was impossible. Rather, individual elements of the overall plan were tested and minimal focus was placed on the role of the submarines within the exercises.

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<sup>51</sup>Boyd and Yoshida, 5.

<sup>52</sup>Evans and Peattie, 210-1.

<sup>53</sup>Orita and Harrington, 13,20, 46.

Defying the normal intense scrutiny the Japanese applied to their planning, significant portions of the submarine parts of the plan were subjected to general tabletop war-gaming vice the normal detailed at sea tests. For the majority of the 1930s, Suetsugu's plan for employment of submarines was an article of faith amongst the remainder of the officer corps and the Navy General Staff. As testing intensity increased in the final few years leading up to the commencement of hostilities in the Pacific, the unacceptability of the plan revealed itself.<sup>54</sup>

The testing and exercises revealed that numerous items that the submarine portion of the overall plan relied upon were deficient. Testing demonstrated that submarines assigned to base surveillance and the picket lines did not have sufficient speed to conduct an attack and then return to a position ahead of the advancing forces to regroup for further attacks. Even removing the need to conduct the attacks required for "force reduction," the submarines were hard-pressed to maintain an appropriate trail of advancing forces to provide position reports. The need to transit submerged for periods of daylight to avoid counter-detection severely limited the speed of advance (SOA) of the submarine even with the significant surface speed increases of the newest classes of submarines. The time and position lost to conduct an attack further limited the SOA. Further hindering the ability of the submarines to maintain position with the advancing enemy fleet was the belief that surface attacks against warships were too risky.<sup>55</sup>

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<sup>54</sup>Evans and Peattie, 219; 271-2.

<sup>55</sup>Ibid., 429-30. As a simple example, a Type B Scouting submarine operating in a reasonable 10 hours submerged, 14 hours surfaced running pattern would travel a total of 379 miles (50 submerged (5kts)/329 surfaced (23.5kts)) in a straight lined assuming no impact from other influences. A surface battle force during a 24 hour period could average slightly less than 15.8 kts to cover the same distance. Therefore, if the battle

Another key item of the submarine portion of the attrition strategy that failed to come to fruition was the control of the submarine picket lines from command (or headquarters) submarines within the lines themselves. The coordination of communications and navigation from a platform at sea that was subject to the elements proved nearly impossible with the technology on hand and the vagaries of the environment. As such, the coordination of operations shifted to shore facilities significantly removed from the area of operations.<sup>56</sup> The movement of the command and control responsibilities to the shore did not remove the challenges of communications as the units reporting and receiving information were still subject to the elements and need to avoid counter-detection. The failure to properly coordinate the operations of the submarines from an at sea platform certainly influenced the failure of the Japanese submarine force to adopt “wolfpack” style operations like the other major navies.

Other conclusions reached during the exercises just prior to the start of the war included the recognition that extended surveillance of enemy bases was a difficult endeavor. This type of surveillance required more assets for proper conduct than originally believed. The focus that commanders placed on concealment of forces during conduct of the plan led to extreme caution on the part of submarine commanders. This cautious approach by commanders led to ineffective conduct of some of the major roles of the plan. A cautious operating cycle led to less effective patrols by the submarines in

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force was traveling faster would require the shadowing submarine to stay on the surface longer thereby exposing itself to greater risk of counter-detection during daylight hours.

<sup>56</sup>Ibid., 430. Because of the failure to immediately show positive control of operations from submarines at sea with the picket lines, the Type A Headquarters submarines were limited to a total build of 3.

the picket lines as well as broken periods of coverage in surveillance of enemy bases in exercises. This cautious view also led to less effective attacks by submarines of the simulated advancing forces when they managed to get into position. One positive item from the exercises was the proof of the embarked scouting aircraft as an effective force multiplier in picket and surveillance duties. The area coverage of the planes was sufficient to counter some of the losses due to heightened caution of commanders and insufficient speed of vessels but it could not eliminate them.<sup>57</sup>

The exercise conducted in October of 1940 also provided some results of interest. The exercise was conducted in the waters around the Japanese home islands and had the largest focus on commerce raiding of all the Japanese pre-war exercises. During the course of this exercise, Japanese submarines operating with a shore-based command and control system counted 133 merchant “sinkings” in their tally. Instead of walking away with a first-hand respect for the capabilities of submarines in commerce raiding, the Japanese commanders focused on the vulnerability of their submarines to detection by radio direction finding systems. The amount of message traffic sent by headquarters to submarines and subsequent response traffic from the submarines placed the boats at risk of triangulation.<sup>58</sup> While the recognition of this particular vulnerability was an important thing to learn, the lack of acknowledgement of the merchant ship “sinkings” shows the unwavering focus on a “combatants-first” strategy.

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<sup>57</sup>Ibid., 428-9.

<sup>58</sup>Ibid., 430-1.

### Conclusions of the Interwar Period

The Japanese conducted an ambitious and challenging expansion and readiness program to prepare for war with the United States. They developed a strategy that fit with their overall ideology of warfare built on their experiences in the Russo-Japanese War and World War I. An outspoken officer with little submarine experience who would rise to the head of the entire Imperial Japanese Navy developed the basis for the submarine role in the plan. The technological developments within Japan created an advanced and highly capable submarine force that had distinct size, speed and range advantages over those of other major navies. They expanded the capabilities of their force by employing aircraft and a torpedo that was far superior to others in use around the world. Rigorous training just prior to the start of the war attempted to build numerous new skills in the submarine crews. The magnitude of the overall plan and unchallenged belief in the strength of their strategy led to a dearth of detailed testing and exercises prior to actual combat operations. The exercises conducted showed that many aspects of the overall plan were unworkable but it was too late to restructure the plan without disrupting the entire war effort. The minimal exercises also failed to allow the submarine force the time necessary to adapt their new skills in realistic trials. Amid the most challenging exercises, the Japanese still failed to find a firm focus for their efforts. They lacked the dominant personality to command their submarine operations. There was no Japanese version of Admirals Nimitz and Lockwood from America or Admiral Doenitz from Germany.

World War II then started with the Japanese submarine force in possession of extremely capable submarines served by technically competent crews that had not received adequate preparation to conduct full-scale operations in the Pacific within the

confines of the overall strategy. The submarine force entered the war needing to adapt to the lessons from the final few exercises of the interwar period.



### CHAPTER 3

#### EARLY WAR AND LIMITED SUCCESS: PEARL HARBOR THROUGH GUADALCANAL

Our best course of action is to deliver a knockout blow to the American Fleet at the very start. Then Japan can operate . . . without fear of effective opposition. We can build up our island defense ring, and strengthen our fleet for the day when the recovered American navy tries to move westward. At that later meeting, with our strength at its peak, we can destroy it completely.

— Admiral Isoroku Yamamoto, *I Boat Captain*

Faced with the realization that the overall plan to draw the American Fleet out for a decisive battle was unmanageable for the Imperial Japanese Navy at the outset of war, Admiral Yamamoto opted for a “knockout blow” to disable the American Fleet thereby allowing the Imperial Japanese Navy to expand unabated. Since a significant part of the “decisive battle plan” relied on the submarine force, the alteration of the plan necessitated an alteration in the employment of the submarines. This left the Imperial Japanese Navy to develop new methods of employment for their advanced vessels on the eve of war.

At the time that the Imperial Japanese Navy made their final preparations to sortie for the attack on Pearl Harbor, the submarine force consisted of sixty-three frontline vessels that included forty-eight I-series large submarines suited to long-range offensive combat operations and fifteen RO-series medium submarines that were more suited to area patrol and defensive operations.<sup>59</sup> These submarines formed seven squadrons. Squadrons 1, 2 and 3 consisted of front-line I-series submarines tasked with attacking American fleet combatants. Besides attack and scouting submarines, each of these

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<sup>59</sup>Polmar and Carpenter, 11.

squadrons also included submarine fitted out as flagships. Squadrons 4 and 5 included front-line I-series submarines mixed with older vessels. Squadron 6 contained the mine-laying submarines. All three of these squadrons were tasked with operations in support of invasions in the southern Pacific Ocean to seize resources. Squadron 7 consisted of RO-series submarines and older vessels assigned to defense of the Home Islands and the Mandates.

### Opening Shots

Thirty submarines were assigned to various roles in the attack on Pearl Harbor with only three directly assigned in support of fleet units. These submarines supported four major tasks during the transit to and attack on Pearl Harbor: Advance Scouting, Carrier Striking Force Protection, American Fleet Containment, and Counter-Attack Defense. *I-26* and *I-10*, constituting the Reconnaissance Unit, conducted scouting missions to the Aleutian Chain and South Pacific Islands, respectively, to attempt to locate units of the American Fleet that might risk the security of the Carrier Striking Force. No significant forces were observed during the reconnaissance patrols and both vessels fell into the containment scheme around Oahu. Three submarines were assigned as protection assets as part of the carrier Striking Force. These three submarines were the only ones to operate in a role similar to one that they had trained for in the years of exercises prior to World War II.<sup>60</sup>

The balance of the submarines fulfilled the requirements of the final two tasks. These submarines positioned around Oahu to form a containment cordon that could be

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<sup>60</sup>Ibid., 13.

reorganized to provide rear protection to the Carrier Striking Force as it withdrew. Included in this force were five submarines of the Special Attack Group that carried Type A midget submarines that would attempt to enter the harbor and intensify the attack. The majority of submarines assigned to this group suffered from some level of training deficiencies, material issues and inexperience. The members of the midget force were affected in particular. As an example, the *I-24* conducted her maiden voyage less than a month before taking part in the Pearl Harbor operation. She only had eight days in port to train and have modifications made to operate as a midget —mother? In the course of the Pearl Harbor operation, she suffered numerous mechanical failures and was nearly lost at least once.<sup>61</sup>

Following participation in the attack in which no submarine fired a torpedo, and all the midget submarines were lost, the Japanese commanders were determined to increase the effectiveness and involvement of the submarines. On 9 December, *I-9* sighted an American aircraft carrier (USS *Enterprise*) and promptly relayed the position and course information. Adm. Shimizu, commander of the Sixth Fleet, organized the pursuit from his flagship anchored at Kwajalein. In the belief that any surviving vessels would be heading for safety on the West Coast, Adm. Shimizu directed the submarines of the First Submarine Group, combined with the Reconnaissance Unit, to transit east to find and sink the carrier.<sup>62</sup> Two days of pursuit resulted in two failed torpedo attacks and the exposure and sinking of *I-70* by *Enterprise's* dive-bombers. The poorly organized search led to the loss of the first Japanese submarine and the diversion of numerous

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<sup>61</sup>Hashimoto, 21-22, 24-25.

<sup>62</sup>First Submarine Group consisted of *I-9*, *I-15*, *I-17*, and *I-25*.

submarines from the containment cordon around Pearl Harbor. Adm. Shimizu failed to re-organize the submarines left in the vicinity of Pearl Harbor to fill the gaps created by the departure of the searching group.<sup>63</sup> The cordon was further weakened by the requirement that the ~~mother~~” submarines make every effort to recover the midgets, thereby causing them to remain in a small area south of Lanai instead of searching for targets. After over four days of searching for the midgets, the five ~~mothers~~” departed for Kwajalein.<sup>64</sup> The disintegration of the cordon allowed the free movement of the American carriers after the attack on Pearl Harbor.

The disorganized effort to find and sink the *Enterprise* is a prime example of the issues facing the Japanese submarine force. The Sixth Fleet Commander broke the integrity of the cordon for an attempt at sinking a carrier. He skewed his operational plan based on false assumptions (eastward retreat) borne of the discarded prewar strategy. The diversion of forces for the search and midget recovery depleted the cordon force by over 40% with no realignment of forces. Ultimately, his choices restricted the ability of the Japanese submarines to find any combatants, including the carriers. Certainly, the distance of the commander from the area of action hampered his decision-making ability as well. Even though the submarine force learned that their submarines could not keep pace with surface combatants during their pre-war exercises, the pursuit group was still dispatched to attempt the chase using techniques that ultimately led to the loss of *I-70*. The insistence on attempting to recover the midget submarine (because of the requirement to include midgets in the operation) significantly depleted the combat power

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<sup>63</sup>Boyd and Yoshida, 58-59, 62-63.

<sup>64</sup>Ibid., 59-61.

available in the area. Further, the midget submarines failed to provide any positive contribution to the overall operation and very nearly exposed the entire operation by their detection prior to the air attack. The midgets also provided the Americans with their first Japanese prisoner of war.

The errors in submarine employment during the attack on Pearl Harbor arose from the insufficient prewar exercises and associated training. As such, the submarines operating in the vicinity of Pearl Harbor did not have sufficient experience in the skills and tactics necessary to maintain the cordon. Similarly, the command elements did not have the necessary experience to organize the cordon and attempt to contain breakouts. The commanders did not have the opportunity to practice reorganization of the cordon or employment of the midget submarines. Based on past exercise failures, the staff did not employ the two command submarines (A Type) to control operations on the scene and instead chose to direct the entire operation from Kwajalein.

Even with the lack of results in the actual attack and the days following Pearl Harbor, the Japanese submarines were not without effect. They were able to sink a small number of ships in the days after Pearl Harbor as well as one each by *I-10* and *I-26* during their reconnaissance cruises.<sup>65</sup> The limited results rested on the lack of training in independent operations coupled with the insufficient training with actual torpedoes. Strict rules for torpedo employment also limited the potential of the submarines unnecessarily

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<sup>65</sup>Polmar and Carpenter, 18. Japanese claims for operations conducted in December 1941 included 20 ships (17 sunk and 3 damaged). Allied records for this period document only six lost vessels.

by restricting the numbers of torpedoes versus target type.<sup>66</sup> The intelligence gains of the submarines in support of the operation surpassed the modest results for sinkings. The operations of *I-10* and *I-26* verified the freedom of the Carrier Striking Force to transit to the Hawaiian Islands without threat from American detection. Further, these vessels proved the usefulness of the excessive range available to the large Japanese submarines by allowing operations in Hawaiian waters after their long reconnaissance cruises to the North and South Pacific. After the attack, the detection of the *Enterprise* by the *I-9* provided the most solid evidence that carriers had survived the air attack. The *I-9* launched its scout plane on 16 December to conduct reconnaissance of Pearl Harbor thereby providing further proof that the carriers were not at Pearl Harbor as well as reporting the extent of the damage from the attack. Thus, the operations of submarines provided intelligence that allowed the Carrier Striking Force to operate with impunity while reporting their results without requiring them to remain in range to conduct their own reconnaissance flights.

While the Sixth Fleet submarines struggled to assert their combat relevance at Pearl Harbor, the submarines of the Third, Fourth and Combined Fleets operated in the Southwest Pacific in support of landing and containment operations. These operations followed the prewar plan for the Southwest Pacific. Squadron 6 submarines laid minefields while Squadron 4 and 5 boats provided support to the landing operations. The operations in the Southwest Pacific more closely aligned with the training provided

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<sup>66</sup>Padfield, 36. Regulations limited the numbers of torpedoes that could be employed versus various target types. Carriers and battleships rated a full salvo (4 or 6 torpedoes depending on submarine type), cruisers 3, and destroyers and merchants a single torpedo.

during the pre-war exercises. The submarines acted as a screen for the transports and a number of vessels formed a picket line to intercept Allied vessels leaving from Singapore to threaten the amphibious operations. Their biggest contribution to the initial landings occurred when the HMS *Prince of Wales* and HMS *Repulse* departed Singapore to attack vessels conducting a landing on the Malay Peninsula. The scouting line detected the British vessels which forcing the British to alter course. The scouting line regained contact and continued reporting the position of the vessels. Even though the *I-58* failed to score any hits out of five torpedoes expended, the position data was critical to allow Japanese land-based naval air assets to sink the only capital ships operating in the Southwest Pacific.<sup>67</sup> At the conclusion of the initial landings in the Southwest Pacific, submarines failed to provide a large list of sinkings to their Fleet Commanders. Nevertheless, the aim of the war plans was realized as all the landings occurred with minimal interruption. The submarine picket line altered the British operations by removing the cloak of surprise from their counter-invasion operations. Ultimately, they facilitated the destruction of the British capital ships before they could threaten any of the landing operations. The submarines completed their responsibilities without the need of their torpedoes, although the failure of *I-58* continued a distressing trend.

Emblematic of the lack of operational experience and preparation in the early stages of the war were the numerous failings of operational security among the submarines. The detection of the midget submarines prior to the air raid on Pearl Harbor risked the compromise of the entire plan even though the midgets were not a significant part of the attack. The haphazard attempt to engage the *Enterprise* exposed the

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<sup>67</sup>Padfield, 182-183; Orita and Harrington, 44-45.

submarines involved to detection because of the high speed directed for the search. A further example of the lack of operational security stemmed from the desire of the crews to have an impact (and potentially some level of pride and face-saving on the part of the commanders). Upon departure from their patrol stations around the Hawaiian Islands, each submarine would conduct a shore bombardment against various positions. These acts of dubious military value provided significant counter-intelligence to the American forces in the Hawaiian Islands. The Americans quickly learned that the bombardments were an indication of the departure of a submarine from its patrol station. This knowledge allowed the Navy to route military and merchant traffic in response to the movement of Japanese submarines thereby limiting the ability of the Japanese submarines to find and prosecute targets.<sup>68</sup> The significant number of radio transmissions required by the Naval General Staff facilitated the sinking of the *I-173*. American forces were able to triangulate her position and anticipate her direction of movement to allow the prosecution.<sup>69</sup> As evidenced in these examples, the lack of operational security was at all levels of the submarine force from the strategic planning of the initial attack, to the operational coordination of the *Enterprise* "chase" to the tactical actions of the individual commanders and crews in the Hawaiian Islands. The depth of the issue is most intriguing when the key "lesson" of the October 1940 exercise is considered. Therefore, even with the concern for security because of this exercise, the force failed to translate the lesson to action.

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<sup>68</sup>Polmar and Carpenter, 17.

<sup>69</sup>Orita and Harrington, 50.



### Moving Forward to Coral Sea and Midway

The breaking of the cordon around Pearl Harbor and failed attacks on the *Enterprise* led to the transfer of nine submarines to the American West Coast in an attempt to cut off supplies and reinforcements to Pearl Harbor to prolong the time required to restore the American naval forces in the Pacific.<sup>70</sup> While the underlying idea was sound, the execution lacked the mass required to complete the task. The division of the forces between the American West Coast cordon, the Hawaii Island cordon and the Carrier Striking Force rearguard left insufficient forces in each cordon to control the area. The disposition of forces also reduced the on-station time of the blockading assets due to the time needed for the advancing and return transits.

An analysis of the operational impact of the transfer of forces to the West Coast will be examined using the example of *I-15*. The *I-15*, a B Type scouting submarine, had a 14,000 nm cruising range at 16kts on the surface. Departing Yokosuka on 21 November, she arrived off Oahu on 6 December (4000 nm) where she conducted operations until assigned to assist in the hunt of *Enterprise* on 9 December. After Adm Shimizu ordered the chase abandoned, *I-15* received orders to the West Coast where she arrived on 17 December (2600 nm). Eight days of operations culminated on 25 December with direction to return to Kwajalein. *I-15* pulled into Kwajalein on 15 January (5000nm).<sup>71</sup> Therefore, in 55 days of operations, *I-15* traveled well over 11,000 nm just in the major transits that she completed irrespective of the search distances while operating in her cordon role. In those 55 days, she spent only 11 days in the cordon

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<sup>70</sup>Ibid., 39-40.

<sup>71</sup>Orita and Harrington, 22, 40-41, 45.

operations expected to destroy warships that survived the initial Pearl Harbor attack and cut off replenishment and reinforcements to the islands. Based on the 2800nm distance from Pearl Harbor to Kwajalein, the transit would have taken approximately 12 days. Had *I-15* stayed in the Hawaiian Islands, she could have maintained her station for at least 26 days prior to departing for Kwajalein. This significantly reduced the effectiveness of the submarines by both increasing the amount of area they had to cover and decreasing the amount of time they could patrol it.

While the manner of employment of the submarines did not yield the impressive results that the Naval General staff desired, it did highlight the long reach of the A, B, and C Type submarines that the Japanese had built. The greater than 11,000nm transits by *I-15* and her six consorts (who all also participated in a couple days of high speed operations attempting to intercept *Enterprise*) combined with the long reconnaissance patrols by *I-10* and *I-26* showed the inherent possibilities available to the Japanese submarine force due to their long range. Operating out of Kwajalein, a submarine of the newest type (A, B, or C) could have patrolled along the coast near San Diego for almost 30 days to attack coastal traffic. Three submarines could have maintained a near continuous presence of one submarine on the coast. This same submarine could have patrolled Hawaiian waters for almost 50 days when basing out of Kwajalein. Subsequently, two submarines could have provided continuous presence in the vicinity of the Hawaiian Islands.

#### Prelude to Midway

Preceding the large scale operation at Midway, the Japanese Navy withdrew the majority of its submarines from the vicinity of the Hawaiian Islands and the West Coast

to undergo refit at home.<sup>72</sup> The operational pause was necessary for surface, subsurface and air assets to rest personnel, repair equipment and replenish for follow-on operations. The stunning success of the initial Japanese attacks in early 1942 provided the opportunity to consolidate their equipment and regroup as insufficient assets were available to maintain the offensive pressure continuously. At the conclusion of the refit, the submarine force was reorganized to enhance its operational impact. Part of the reorganization was due to a change in the tactical focus of the submarine force. Submarines were expected to attack merchants and interdict supply lines vice focusing on warships. This was a significant change to the tactical focus of the submarine force in the spring of 1942. This change in tactics did not alter the strategic goal of generating a “decisive battle” to eliminate the American fleet.<sup>73</sup>

Prior to the refit period, in February of 1942, seven submarines were detached from the 30 vessels conducting war patrols to participate in the K-Operation. This operation used submarines to act as refueling, navigation and weather reconnaissance support to an attack on Pearl Harbor by two Japanese “Emily” flying boats. These submarines were removed from their patrol duties for almost a month and ultimately suffered the loss of *I-23*. As she was the weather reconnaissance unit in the plan, the flying boats did not know about the excessive cloud cover over the harbor and were unable to drop their bombs on worthwhile military targets. One set of bombs landed in the ocean while the second struck civilian housing miles from the naval base.<sup>74</sup>

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<sup>72</sup>Polmar and Carpenter, 14.

<sup>73</sup>Polmar and Carpenter, 23; Orita and Harrington, 57.

<sup>74</sup>Orita and Harrington, 55-56.

Ultimately, the divergence of nearly a quarter of the available patrol assets from their cordon areas for this operation resulted in no sinkings or damage to ships. The operation failed to provide any usable intelligence (due to weather) and based on the scale of aircraft involvement probably would not have realistically caused significant damage to anything but the American psyche. While the psychological impact of another unchallenged attack on Pearl Harbor could have been significant, the effect could have been possible simply by using the scout planes embarked on the patrolling submarines combined with dedicated shore bombardment around Oahu.

In support of the Japanese planned invasion of Port Moresby (Operation MO), the six submarines of Squadron 4 were deployed with the attack force. These six boats were tasked with conducting shaping reconnaissance of the operating area to determine landing sites, shipping routes, and enemy activity. In the area assignment of forces, *I-21* was arrayed in the best position to locate the American battle force. On May 2, she sighted American warships, but failed to observe any aircraft carriers. Of particular impact in the search, *I-21* failed to use her embarked plane for scouting thereby restricting her ability to survey the area. As such, the Japanese force did not identify the position of the aircraft carriers to launch a preemptive attack. In the end, with the American loss of USS *Lexington*, the Battle of the Coral Sea was a tactical victory for the Japanese, but strategically, the Americans stopped the advance on Port Moresby and stalled further advances in the South Pacific. Additionally, the losses suffered by Yamamoto's air

groups at Coral Sea ensured he would have two less big carriers (*Zuikaku* and *Shokaku*) for his upcoming Operation MI against Midway.<sup>75</sup>

### Midway

The submarine effort in support of the invasion of Midway consisted of a number of other operations designed to drive the American forces into the “decisive battle” that the Japanese desired. One squadron of submarines (the newly created Squadron 8), consisting of five submarines including a Type A Command boat, was sent to the Indian Ocean while a separate attack force, also of five submarines, was sent to the east coast of Australia. Both units were equipped with A-Type midget submarines and were tasked with conducting attacks on major ports. Outside of these specific attacks, the submarines were expected to roam and attack merchants. Both attack forces employed their scout planes to reconnoiter their respective targets of Diego Suarez (a port in Madagascar) and Sydney Harbor, respectively. Within 24 hours of these scouting flights confirming the presence of warships in the harbors, each attack force launched midget submarine attacks. The attack on Sydney Harbor failed to claim either of the two major combatants in the port, but did destroy a ship being used as a “floating hotel” for servicemen. The attack in the Diego Suarez destroyed a tanker and damaged the British battleship HMS *Ramillies* (removing it from action for almost a year). The Japanese Navy hoped that these

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<sup>75</sup>Hashimoto, 89; Polmar and Carpenter, 23; Jonathan Parshall and Anthony Tully, *Shattered Sword: The Untold Story of the Battle of Midway* (Dulles, VA: Potomac Books, 2005), 63.

harbor attacks coupled with increased submarine operations in more distant areas would drive the American commanders to join in a ~~decisive~~ battle.”<sup>76</sup>

The dismal results of the Japanese submarine forces at Midway were foreseen in the lackluster planning applied to the operation. Vice Admiral Komatsu, commander of the Sixth (Submarine) Fleet, played little role in the generation of the employment plan. Enamored of Yamamoto’s previous successes, Komatsu considered the result at Midway a foregone conclusion and chose to focus on follow-on operations without questioning the overall plan. The organization of the Midway submarine effort was left to junior staff officers. As a result of the lack of attention from senior staff personnel, details of the submarine cordon plan were left out of the official orders for Operation MI. The lack of focus on the task was not a fault of the submarine staff alone. War games conducted in preparation for Operation MI were little more than rubber stamps for the operation as Yamamoto’s Chief of Staff, Admiral Ugaki (acting as the umpire for the games) frequently overlooked the difficulties in the plan and forced the games to move forward without questions from the underprepared staff that was present.<sup>77</sup>

The submarines assigned to the Midway and Aleutian (AL) Operations had a number of disparate roles. Two submarines conducted a reconnaissance of the Aleutian Islands in advance of the invasion force and then departed for the West Coast. Three submarines assigned to the Aleutian Operation (out of four total) were tasked with supporting the invasion force in its initial actions followed by forming the easternmost

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<sup>76</sup>Orita and Harrington, 63-64, 69-70. *Ramillies* would ultimately be repaired in time to participate in the D-Day Invasion.

<sup>77</sup>Parshall and Tully, 61, 97.

scouting line, approximately 1000 miles from the West Coast, to provide early warning in support of the Japanese forces approaching Midway. Squadron 1, consisting of seven submarines, was assigned to follow the invasion force into the Aleutians and ended up being reassigned to the West Coast based on the lack of targets and operational need in the Aleutians. In total, thirteen submarines were committed at some point to the Aleutian phase of the operation with three transitioning to patrol in support of the Midway attack and nine proceeding to the West Coast. One remained in the Aleutians. These boats recorded four merchant sinkings along with the shelling of various coastal areas. None of the American forces at Midway were detected.<sup>78</sup>

The Japanese Navy also dispatched seven submarines from the Midway force to attempt a second K-Operation sortie over Pearl Harbor. *I-121* and *I-123* were assigned as the refueling assets and encountered American ships in the anchorage at French Frigate Shoals. The operation was called off when the American vessels did not depart after a few days and the Japanese conducted no alternate attempts to scout Pearl Harbor.<sup>79</sup>

In addition to the three submarines forming the easternmost scouting line composed of boats from the Aleutian Operation, two more scouting lines were arrayed in search of American forces. Five submarines from Squadron 3 involved in the K-Operation were assigned to the southeast of French Frigate Shoals to block the southern side of the Hawaiian Island chain. The eight submarines of Squadron 5 were assigned to

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<sup>78</sup>Polmar and Carpenter, 21, 26; Orita and Harrington, 64, 88. The *I-25* also sank the Russian submarine, *L-16*, during her patrol on the West coast. At the time of her sinking, *L-16* was traveling in concert with *L-15* as both vessels conducted interfleet transfers from Vladivostok (Pacific Ocean) to Murmansk (Barents Sea) via the Aleutians and American West Coast.

<sup>79</sup>Orita and Harrington, 63.

form a third picket line 900 miles east of Midway to block the northern side of the Hawaiian Island chain. These two lines were expected to be in place by 4 June but in the end the lines were only completed on 6 June. The delays evolved from the operational commitment of the Squadron 3 boats to the failed repeat of the K Operation and the increased maintenance requirements of the older boats assigned to Squadron 5. The Squadron 5 boats were delayed by difficulties during their refits in Japan and subsequent materiel issues requiring repair at Kwajalein prior to departure for Midway. Exacerbating the delayed arrival of the Squadron 5 submarines was failure of Komatsu to inform Yamamoto that the scouting lines were not formed by the time expected.<sup>80</sup> Consequently, the Japanese force had no intelligence about the American aircraft carriers due to the failed K-Operation flight and the incomplete scouting lines. By the time the lines were complete, the American force had passed completely and four Japanese aircraft carriers lay at the bottom of the Pacific Ocean.

When Yamamoto made the decision to abandon the Midway operation, all submarines were shifted to a scouting line 500 miles east of Midway in a final attempt to mitigate the loss of aircraft carriers by sinking the American aircraft carriers. The attempt was abandoned when Yamamoto had the scouting line moved to the 180th Meridian to cover the withdrawal of the remaining Japanese surface forces. This line finally formed completely on 10 June and then was quickly dispatched in another high speed run to the east when the American carriers had finally been located. After the series of line shifts

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<sup>80</sup>Hashimoto, 87; Orita and Harrington, 65, 71; Parshall and Tully, 98. Oddly, Komatsu had no issue informing Yamamoto of the failure of the K-Operation reconnaissance flight to Pearl Harbor, but balked at reporting the delayed arrival of the scouting lines.



requiring high-speed transits by the boats, the submarines lacked the necessary fuel or speed to overtake the withdrawing American carriers.<sup>81</sup> The unsettled employment of the submarines after the late assembly of the initial scouting lines further degraded their effectiveness in support of the “decisive battle” around Midway.

The lone success of the Japanese submarines at Midway occurred when *I-168* sank the American aircraft carrier USS *Yorktown*. While the overall impact of the sinking cannot be overlooked from the aspect of total aircraft carrier strength in the Pacific, the sinking also provides a prime example of the efficacy of Japanese pre-war individual unit training. Commander Tanabe, commanding officer of *I-168*, successfully penetrated a screen consisting of five destroyers around *Yorktown* with an eight hour submerged approach in daylight. His persistence in the approach led to the sinking of *Yorktown* as well as the destroyer USS *Hammann* that was providing services to damage control team onboard the already damaged carrier. While the approach was made easier by the slow speed of advance of the *Yorktown* and her escorts, the experience gained in pre-war exercises prepared Tanabe and his crew for the lengthy approach and follow-on seven hour evasion that made Tanabe a national hero.<sup>82</sup>

The series of coincidences that led to Tanabe’s successful attack give an interesting insight into the vagaries of combat. Material issues onboard *I-168* delayed her ability to join her assigned scouting line. Based on this delay, *I-168* was assigned to conduct a reconnaissance of Midway and then join in a bombardment of the islands along with a force of four cruisers. During her reconnaissance, she reported increased activity at

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<sup>81</sup>Boyd and Yoshida, 83.

<sup>82</sup>Padfield, 239-242; Boyd and Yoshida, 84-86.

Midway that should have alerted Yamamoto that the surprise attack had been compromised. Unfortunately for the Japanese, these vital reports were ignored. Based on her modified tasking, *I-168* was the only vessel in close proximity to the reported position of *Yorktown* and able to press an attack.<sup>83</sup>

Zenji Orita, a Japanese submarine captain during World War II, contends that the major failing in the Japanese deployment of the submarines assigned to the Midway force was the failure to array the submarines ahead of the carrier force as done at Pearl Harbor. The Japanese submarines moved in broad scouting lines in advance of the Carrier Striking Force until they reached station around Oahu. At Midway, the submarines were deployed independent of the surface forces and did not effectively search ahead of the force for the American aircraft carriers.<sup>84</sup>

While the general idea that the array of forces was ineffective is true (since no submarines gained contact on the American forces before the battle was over), to simply say a change in disposition of the forces would have altered the battle is disingenuous to the other issues involved. First among the issues is the broad disposition of available forces. Viewing Midway as the possible position of the “decisive battle,” the Japanese Navy committed thirteen submarines to the associated operation in the Aleutians making them unavailable for immediate reassignment to the Midway effort. Further, seven boats were assigned to the failed K-Operation thereby delaying their arrival onto their picket

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<sup>83</sup>Padfield, 239-242; Boyd and Yoshida, 84-86; Parshall and Tully 99. Tanabe observed over 100 aircraft sorties a day during his reconnaissance operation. He observed the long periods of time between launch and recovery of the patrol aircraft that indicated very long range patrol operations. He also observed construction operations at all hours of the day that indicated attempts to improve readiness on the islands.

<sup>84</sup>Orita and Harrington, 88.

line. This does not even consider the ten submarines assigned to the Indian Ocean and Australian operations as they were ostensibly in support of moving the Americans towards commitment to a “decisive battle” at Midway. Thus thirteen vessels were removed from the vicinity of the “decisive battle” while ten more were committed to questionable operations that failed to influence the American response at Midway.

Second, ten of the submarines assigned to the effort at Midway represented some of the oldest and least capable in the force. The age and poor condition of the eight submarines of Squadron 5 directly contributed to their inability to gain their picket stations prior to the battle. Prior to their inclusion in the Midway plan, all the boats of Squadron 5 had been slated for designation to training and coastal defense duties. The *I-121* and *I-123*, two of the four minelayers of the KRS Type, had their mining equipment removed to install maintenance shops and extra fuel to support the K-Operation thereby negating one of their greatest capabilities. At the same time, the more capable boats of Squadron 2 along with newly built units formed the forces that travelled to the Indian Ocean and Australia thereby reducing the combat capability of the boats assigned to the Midway operation. None of the boats assigned to the Midway force carried scouting airplanes that could have conducted the surveillance of Pearl Harbor in lieu of the failed K-Operation. The addition of submarines with scouting aircraft could have also mitigated the relatively small number of submarines specifically assigned to support the attack.

Finally, the haphazard shifting of the patrol lines exacerbated the problems due to the small number of submarines assigned to the Midway Operation and their overall quality and capability. The disorganized movements negated the ability of the submarines to actually search for the American forces and nullified their ability to go on the offensive

when the American warships were located. The shifting of lines opened gaps to allow freedom to the American forces in much the same way that the cordon around Pearl Harbor was rendered ineffective by removing nearly one third of the available submarines for the chase of *Enterprise*.

Viewed in their entirety, these three issues all have a foundation in the lackadaisical planning conducted by the Naval Staff in the creation of the plan for Operation MI. Based on past successes, the senior commanders chose to focus on operations further in the future. Subsequently, the junior staff left to work out the details did not challenge the plan initially proposed by Yamamoto. The detailed planning and wargaming that made Pearl Harbor successful was not utilized to generate appropriate contingency plans or identify faults. Weaknesses in unit capabilities were not identified. Operation MI was a failure before it began and the submarine force effort in it was almost non-existent.

### Guadalcanal and the South Pacific

While the defeat of the Japanese forces at Midway represented a significant shock to the combat power and momentum of the Japanese Navy, the operation at Guadalcanal represented the last opportunity for the Japanese Navy to perform a significant counterstrike against the nascent American counter offensive following Midway. While the operations of the Japanese submarine force at Guadalcanal had little impact on the actual events there, they are the high point of the Japanese effort to sink or damage capital ships. The submarines would account for one aircraft carrier and one cruiser sunk along with a second aircraft carrier and a battleship damaged and removed from operations for months.

At the beginning of American operations near Guadalcanal, only two units of Squadron 7, *RO-33* and *RO-34*, were in close proximity, operating in the Bismarck Sea. *I-121*, *I-122*, and *I-123*, the old minelayers, were dispatched to reinforce the effort. By 24 August, ten more submarines had been diverted to the area from Japan and Australia. The task of the initial submarine forces was to cut the shipping lanes to Guadalcanal, but they failed to have any impact for the first three weeks of the invasion thereby allowing the Americans to grab a vital foothold on the island. In general, the submarines were effective at reporting the positions of naval units but unable to generate the desired sinkings. A further group of reinforcements was sent in by 19 October without significantly impacting the result of the invasion.<sup>85</sup>

The submarines initially formed two scouting lines, one 200nm northeast of Guadalcanal and a second 150nm southwest of Guadalcanal. The intention of the lines was to interdict supplies and warships from Hawaii and Australia. On the evening of 24 August, two submarines sighted aircraft carriers and the subsequent reports led to direction to all submarines on the picket lines to intercept. After a day of fruitless searching, the submarines were dispersed back to their picket positions where they would remain until the picket lines were reorganized on 31 August. This reorganization did ultimately place the submarines in a position to conduct a couple critical engagements that will be discussed later. Besides picket duties, submarines were also tasked with seaplane reconnaissance and nuisance raids on neighboring islands.<sup>86</sup> Even with the successes that occurred, the submarines suffered from continuing lines shifts and fruitless

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<sup>85</sup>Polmar and Carpenter, 27-29; Boyd and Yoshida, 98; Orita and Harrington, 107.

<sup>86</sup>Boyd and Yoshida, 95, 97-99.

chases like the closing days of operations around Midway. This led the submarines into an untenable position of continuously chasing events vice being able to position ahead of American forces.

As at Midway, the employment of submarines at Guadalcanal did lead to some critical successes. On 31 August, Commander Minoru Yokota, commanding officer of the *I-26*, conducted a screen penetration followed by a 12 hour evasion that resulted in damage to the aircraft carrier USS *Saratoga* removing her from combat operations until late November. Commander Takaichi Kinashi, commanding officer of *I-19*, conducted a screen penetration on 15 September that resulted in the sinking of the aircraft carrier USS *Wasp*, damage to the battleship USS *North Carolina* and eventual sinking destroyer USS *O'Brien*. This penetration resulted in 23 warships in range of the *I-19*'s torpedoes at the same time period as the sinking of the *Wasp*. On 13 November, Yokota conducted another attack against a force of five warships that resulted in the sinking of the cruiser USS *Juneau*.<sup>87</sup> These successes again reflect well on the pre-war individual unit skill training exercises. Interesting in the results, was the report of Yokota of the "poor state" of American ASW techniques that would lead to overconfidence by later commanders and higher Japanese casualties.<sup>88</sup> The result of the attacks was to reduce the American fleet to one combat capable aircraft carrier in the Pacific, USS *Hornet*. Ultimately, the significant advantage produced by these results was not taken advantage of by the

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<sup>87</sup>Polmar and Carpenter, 28; Orita and Harrington, 121-122, 129. Cdr Kinashi was Japan's top commander during the war based on 6 sinkings early in the war followed by these results at Guadalcanal and later successes. *USS Juneau* is notable as the vessel lost with the five Sullivan brothers onboard that changed the US Navy's policy for assignment of family members to combat units.

<sup>88</sup>Orita and Harrington, 121.

Japanese commanders based on trepidation due to the defeat at Midway and lack of intelligence of the American fleet disposition based on the continuous shifting of submarine picket lines.

As the situation on Guadalcanal continued to degrade, the Japanese submarine force resorted to special weapons to attempt to stem the American buildup. Three submarines, *I-16*, *I-20*, and *I-24*, were tasked with operating as mother ships for A-Type midget submarines. They were directed to attack the supply vessels in the vicinity of Guadalcanal landing area with the midgets expected to increase effectiveness in the shallow areas. The series of actions comprising attacks by eight midgets resulted in only one sinking. This effort was the last concerted attempt to target American supply vessels supporting the Guadalcanal operation after 15 November.<sup>89</sup>

The failure of the submarines to provide positive results in the effort to stem the flow of American supplies to their forces on Guadalcanal placed the Japanese Army in a precarious position. The need to reinforce the troops ashore led the submarines to a unique employment: submerged resupply. While the use of submarines for individual supply runs and evacuation missions was a normal event for all major combatants in World War II, the magnitude of the operational scope of the Japanese *mogura*, or “mole,” operations made them unique step beyond that applied by other countries.. On 16 November, all available I-boats were ordered to Rabaul for commencement of supply operations. The I-boats were chosen based on their larger size, and therefore carrying capacity, while the small number of RO-type medium submarines was left to conduct patrols. Submarines involved in supply operations offloaded all of their spare parts and

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<sup>89</sup>Boyd and Yoshida, 103-104; Orita and Harrington, 130.

the vast majority of the crew's rations to make room for ammunition and food for the troops on Guadalcanal. The reload torpedoes and scouting aircraft were removed to make extra storage space in the torpedo rooms and hangar. Deck guns and ammunition were removed to free both space and weight. As the situation worsened, submarines even backhauled and offloaded all of their torpedoes to use the empty torpedo tubes for storage. Thus, the submarines employed in this effort had all of their offensive capability removed. Sixteen submarines joined the operation in the initial thrust with each one capable of providing almost 2 days of supplies in each trip. The effort was considered so critical that Rear Admiral Mito, the commander of the effort, rode *I-8*, for one of the resupply missions to personally survey the risks involved. At the point the submarine resupply operations were cancelled in February, 1943, over 1100 tons of supplies were delivered to the forces on Guadalcanal and over 2000 wounded soldiers were evacuated. In supporting this failed effort, four submarines were sunk while no American ships were sunk or damaged. Significant in these losses was the destruction of *I-1* by the New Zealand patrol craft *Kiwi* and *Moa*. She sank in shallow water where American salvage teams were able to retrieve numerous pieces of communication and cipher equipment.<sup>90</sup>

Once the situation of Guadalcanal became improbable for Japanese victory, the submarines suffered employment as rear guard for units assigned to evacuate nearly 12,000 personnel from the island. Because of the ability to base submarines at Rabaul, smaller, shorter ranged RO-series submarines made up a larger part of the submarines assigned to the area. The tasking of the submarines in the area diverged further and further from pre-war training and plans. In early march 1943, *RO-101* and *RO-103*

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<sup>90</sup>Boyd and Yoshida, 105; Polmar and Carpenter, 29; Orita and Harrington, 135.



sortied solely to conduct a rescue mission to pick up survivors of a ravaged Japanese troop convoy. A later deployment of LCdr Orita's RO-103 had three major tasks listed in the orders to the commander: provide weather reports, conduct air-sea (lifeguard) operations; sink enemy shipping.<sup>91</sup> Japanese submarine operations in the Solomon Islands near Guadalcanal had taken a decided turn to the defensive or worse.

On the surface, the results of Japanese submarines in operations around Guadalcanal appear impressive when viewed against the results at Midway and Pearl Harbor. The submarines sank an aircraft carrier, cruiser, and destroyer as well as damaging an aircraft carrier and a battleship. These successes belied the failure of the submarines to accomplish the desired goal in the waters around Guadalcanal. Only a small number of transports and supply ships supporting the American assault were sunk or damaged. The submarines employed in the Solomons were not able to present a credible threat to the American assault to disrupt the resupply effort.

There were two reasons for the failure of the submarines to achieve meaningful results in the waters around Guadalcanal. First is the shifting of patrol lines in search of targets. While the shifting was fruitful in some respects, the submarines failed to identify and destroy supply vessels before they could discharge their forces and cargo at Guadalcanal and neighboring islands. The shifting of the lines limited the ability of the submarines involved to search their operational areas for supply ships effectively. The submarines also occupied areas where the supply ships would still be protected by warships in less restricted waters vice attacking in the more restricted waters close to the landing beaches.

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<sup>91</sup>Orita and Harrington, 141-142, 148.

The second reason for the poor results in the Guadalcanal area was the dilution of the combat strength in the area due to the assignment of the submarines to missions other than interdiction of the American resupply effort. Submarines were reassigned en masse to resupply efforts instead of offensive action. When not assigned to resupply efforts, they were conducting air-sea rescue or weather reporting as well as other mission in lieu of conducting interdiction. The diversion of submarines to alternate missions effectively ended the ability of the Japanese to influence the result at Guadalcanal and simply delayed the inevitable loss of the island.

#### Operations on the North American West Coast

Sending submarines to the North American West Coast was initially a follow-on action of the diversion of vessels from the Oahu cordon to search for *Enterprise* following the attack on Pearl Harbor. Seven submarines were joined by *I-10* and *I-26*, the boats that conducted the long scouting missions prior to the Pearl Harbor attack, in patrolling the entire expanse of the American West Coast. All nine submarines reached their assigned patrol areas between 17 and 20 December. The long transit to take station off Pearl Harbor, coupled with the search for *Enterprise*, depleted the fuel reserves of the vessels patrolling the coast. As such, the members of the patrol lines departed for Kwajalein on 27 December. Most of these boats arrived at Kwajalein on 11 January to end their first war patrol. The Japanese Naval Staff originally intended for the submarines to bombard various targets on Christmas Eve in a coordinated attack. The attack was delayed and ultimately cancelled. The first foray of submarines to the West Coast

resulted in approximately 80 hull-days on station and the submarines were responsible for the sinking of five cargo ships and damaging of a further five.<sup>92</sup>

This ten-day period would be the last time that multiple Japanese submarines would be in American coastal waters (excluding the Aleutians) at the same time until June 1942. It would also stand as the first and last major Japanese effort to conduct operations off the West Coast. While late December 1941 would be the period of the most submarines operating off the West Coast, late January through mid-March 1942 would account for the longest period of presence on the coast. *I-8* and *I-17* would combine to provide a single submarine on the coast for approximately 50 straight days. This period resulted in no sinkings. Of greatest interest during this period of operations was the bombardment of Ellwood, California by the *I-17*. This marked the first time that the American mainland came under attack since the War of 1812.<sup>93</sup>

Following the patrol of southern California by *I-17*, the Japanese would organize four more patrols by submarines off the American and Canadian coasts. *I-25* and *I-26* conducted patrols during June 1942 overlapping for approximately six days but operating in different areas along the coast. While the operation of these two in general did not have a large impact on the war effort, the *I-25* would return in September 1942. She used her “*GLEN*” scout plane to drop incendiary bombs on forestland in Oregon in an attempt to start forest fires and destroy timber. (Unfortunately for the Japanese, heavy rainfall in

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<sup>92</sup>Webber, 24-25.

<sup>93</sup>*Ibid.*, 29, 82-84. The submarine borne attacks were not the only attacks by the Japanese on the American mainland. The Japanese unleashed numerous unguided balloon bombs during the war. The balloons drifted across the Pacific Ocean towards intended targets in the Pacific Northwest. These attacks had negligible influence.

the weeks prior to the attacks thwarted the plan.) These attacks marked the only time that mainland America suffered aerial bombardment. The final patrol to the West Coast would not occur for two years. *I-12* conducted a patrol to the West Coast in October and November of 1944. *I-12* would be sunk on return from this patrol.<sup>94</sup>

The choice of targets tempered the dramatic nature of some of these operations. The Japanese Navy Staff did not want to risk retaliatory strikes so they initially cancelled the December bombardments. When bombardments were allowed in later patrols, the submarines were directed to avoid bombarding large population centers such as San Diego and San Francisco. The attacks focused on strategic materials (oil fields in Ellwood and timber in the Oregon forests) instead of popular resolve. The effort, however, did not match the goal as the submarine deck guns had limited range and firepower and the “*GLEN*” scout plane was only able to carry two small incendiary bombs. The submarines, operating in limited numbers, could not hope to have significant strategic impact by conducting surface and aerial bombardment.<sup>95</sup>

Japanese operations off the American coast stood in stark contrast to the German efforts on the opposite side of America. While the Japanese push to the West Coast was a follow-on element to the Pearl Harbor attack it was not specifically planned until the units were broken off to pursue the *Enterprise*. Highlighting the failure to plan for contingency operations after Pearl Harbor is the example of the *I-26*. As one of the original two advance scouts with *I-10*, the *I-26* was the first boat to reach the American West Coast, but the boat departed Japan with only ten torpedoes onboard. Total capacity

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<sup>94</sup>Ibid., 37-39, 75-77.

<sup>95</sup>Webber, 82; Boyd and Yoshida, 110-111.

was seventeen. The torpedoes onboard were older, obsolete models instead of the highly capable Type 95 torpedoes. *I-26* was deployed without the ability to conduct an offensive patrol to maximum effect by being provided with a half load of second rate torpedoes. Had detailed consideration been given to follow-on operations, all submarines would have been deployed with full loads of the best weapons available.<sup>96</sup>

The German U-Boat Command, led by Admiral Karl Doenitz, conversely, had developed plans and intent even prior to the entry of the United States into the war. While the Japanese committed nine submarines to their initial effort, the Germans could only muster five Type IX long-range submarines. The significant factor that made the German operation much more successful was the confinement of these limited resources to a smaller geographic area. While the Japanese spread their nine submarines all along the American and Canadian coast, the German submarines intentionally focused between the St Lawrence River and Cape Hatteras.<sup>97</sup>

Once the initial force of Japanese submarines had exhausted their fuel, there were no replacements immediately available to maintain pressure along the coast. The Germans however had three more submarines on station before the original five had to retire. The German U-Boat Command reorganized forces to continue to push assets to the American coast to maintain a constant presence of between six and eight submarines starting in March 1942.<sup>98</sup> The Japanese never attempted to surge a large force of submarines to the West Coast to follow up on the initial nine-boat effort. The Germans

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<sup>96</sup>Webber, 22-23.

<sup>97</sup>Doenitz, 198.

<sup>98</sup>*Ibid.*, 203-204, 214.

continued to push more and more submarines towards the American coast. The German U-Boat Command also responded to changes in the anti-submarine efforts and expanded the area of operations to dilute the available challenge to the U-boat operations. The entire North American eastern coast as well as the Caribbean Sea and Gulf of Mexico were threatened by the U-boats as “Operation Drumbeat” expanded. The Germans further employed mines at significant points on the Canadian and American shorelines as a force multiplier to make up for the smaller than desired number of boats available for operations.<sup>99</sup> While the Allied anti-submarine forces and adoption of convoys in coastal areas ultimately effectively countered the German U-boats off North America, the Germans were able to sink nearly one third of their total tonnage during the war in these operations on the American East Coast.<sup>100</sup> The Japanese never sank more than a small handful of merchants in similar operations.

The dichotomy in the results of the German and Japanese operations is exemplified in the manner of response on each coast to the attacks. The German attacks on the East Coast garnered a contraction of the American forces to the coastline. It also led to a transfer of Allied anti-submarine forces from convoy operations in the Atlantic to support the American effort to secure its coastline. Mine warfare forces were deployed to clear harbor areas. The effort was effective enough to cause the Allies to risk weakening the convoy escort forces to assist the American effort.<sup>101</sup> Conversely, the Japanese effort on the West Coast did little to elicit a widespread military reaction. The lack of results

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<sup>99</sup>Gannon, 73-74; Hadley, 186-187.

<sup>100</sup>Gannon, xviii.

<sup>101</sup>Ibid., 189-190.

from the initial operation on the West Coast allowed the American coastal artillery teams to maintain a centralized basing arrangement. When the shelling of Ellwood City occurred, the coastal artillery teams took nearly three hours to travel from their base in Goleta to firing positions in the area of the attack. Based on the lack of severity of the attack, the coastal artillery chose to maintain the status quo and not deploy to forward positions. By the time *I-17* conducted this shore bombardment in February, the response of the American Civil Defense forces devolved to be nearly non-existent.<sup>102</sup> For their part, the Canadians also had minimal reaction to the attacks. The Canadians enlisted a number of fisherman into the Fisherman's Navy Reserve and used their fishing vessels as an ad hoc patrol force because the anti-submarine vessels were thought to be more necessary in the Atlantic.<sup>103</sup>

### Conclusions from the First Half of the Pacific War

The planned employment of the Japanese submarine force in the early battles of World War II was sound. Unfortunately for the Japanese, the actual use of the submarines was far from acceptable. The failures ranged from lack of patience in maintaining the cordon around Pearl Harbor, to a lackluster commitment of submarines to complete their tasking at Midway to a poor assignment of priorities at Guadalcanal. The Japanese abandoned their original vision of employment of their submarines for a “decisive battle,” but they did not devise a clear alternative. When opportunities were available for the submarines to contribute positively to each of these battles, they were frenetically

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<sup>102</sup>Webber, 83-84.

<sup>103</sup>Ibid., 73-74.

deployed in search of the “big win” sinking of a capital ship. Even after the Japanese announced a tactical change for the submarines to commerce raiding vice hunting warships, they failed to assign them to areas that threatened the American lines of communication or, when they did, they assigned them to tasks to which they were unsuited instead of interdiction. The haphazard employment of the submarines diluted the combat power of an already small force and then dispersed it to areas of questionable strategic value such as the Indian Ocean and the Aleutian Islands.

Despite the issues with their employment, the Japanese submarines did prove the power of their design by conducting numerous long-range patrols in all areas of the Pacific and Indian Oceans. They were capable of providing forward observation and damage assessment after operations were complete. The commanders further showed the efficacy of their individual training through a number of impressive approaches that resulted in significant sinkings. The threat of their presence even influenced the American operations at Guadalcanal.<sup>104</sup> They showed an ability to adapt to the tasking given to them even though much of it deviated from their pre-war training and experience.

Having lost their initial momentum from the attack on Pearl Harbor, the Japanese submarine force would attempt numerous alterations to equipment and tactics. These changes would range from minor and inconsequential to the massive and extreme.

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<sup>104</sup>Scott Farr, “The Historical Record, Strategic Decision Making, and Carrier Support to OPERATION WATCHTOWER” (Master’s Thesis, Command and General Staff College, Ft. Leavenworth, KS, June 2003), 51-52.



## CHAPTER 4

### SUSTAINMENT, SPEED AND SUICIDE TORPEDOES: TACTICAL CHANGES AND TECHNOLOGICAL ADVANCES

Having suffered a number of setbacks in the naval war in the Pacific, the Japanese submarine force leadership attempted numerous changes to their vessels and tactics to attempt to reverse the momentum of operations. The changes had broad consequences on combatant capability across the submarine force. The result was a force consisting of dedicated supply submarines, small high speed vessels, and mammoth aircraft-carrying submarines. —Guided” torpedoes joined the inventory in an attempt to increase results.

#### The Supply Problem

The breadth of the failed logistical effort at Guadalcanal and other islands in the Solomons area drove the Japanese Army to develop its own supply submarines. Not to be outdone by their rivals, the Japanese Navy quickly developed their own classes of supply submarines and associated equipment. As the focused design effort in the interwar period brought about highly capable fleet submarines, the effort mid-war resulted in unique answers to the supply issue. Including the Army supply submarines, five separate classes of supply submarines were built during the war: D1 Type, D2 Type, SS Type, *YU-1*, and *YU-1001*. These submarines were capable of carrying 82 tons of cargo, 110 tons of cargo, 60 tons of cargo, 40 tons, and 40 tons of cargo respectively.<sup>105</sup>

All of these submarines were built without torpedo tubes to maximize the supplies that could be carried. The lead ship of the D1 Type had two torpedo tubes originally

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<sup>105</sup>Bagnasco, 197-199.

fitted, but these were removed due to sea-keeping issues while surfaced and the tubes were omitted from the design altogether for later units. The only armament consisted of machine guns on all and large submarine deck guns for the larger supply boats (D1 and D2 Types). Based on this armament, these vessels could have no offensive role as the machine and deck guns were only for protection when surfaced during supply transfer operations. Later in the war, as the Japanese submarine force size dwindled, five of the D1 Type were modified to carry externally mounted *kaitens* (small suicide torpedoes operated by a single crew member). A small number of the small SS Type submarines were modified to carry 18 torpedoes as reload weapons in support of midget submarine operations.<sup>106</sup>

The focus on supply efforts led to plans for over 200 submarines from the D1, D2 and SS Types. Ultimately, only twelve of 104 planned D1 Type submarines, one of five planned D2 Type submarines and ten of 100 planned SS Type submarines were completed by war's end. The total construction tonnage devoted to supply submarines by the Navy was approximately 29,320 tons. Once the Army's twelve *YU-1* and fourteen *YU-1001* supply submarines are included, the total tonnage climbs over 41,000 tons. The arrival of the supply submarines did not stop the use of attack and scouting submarines in the supply operations, however.<sup>107</sup>

To enhance the capabilities of these supply submarines and the other classes used for this purpose, the Japanese Navy designed a series of supporting equipment types. These consisted of landing craft, gun carriages, and a stores carrier. The *daihatsu* landing

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<sup>106</sup>Polmar and Carpenter, 139-144.

<sup>107</sup>Ibid.

craft were the basic transport mechanism for equipment from submarine to shore. Each class of Navy supply submarine was designed to carry one or more of these craft. They could also be secured to the deck of non-supply submarines when operating in a supply role. The *unpoto* cannon carrier was a set of cylinders designed to allow a submarine to carry a cannon and associated equipment (approximately 20 tons) underwater. Torpedo propulsion systems were attached to propel the carrier to the beach. The *unkato* stores carrier was a submersible cylinder that could be towed by a submarine up to 400 ft underwater. The carrier had space for almost 337 tons of cargo.<sup>108</sup>

A unique bridge between the Japanese Navy's need for supply operations and reconnaissance operations was the SH Type submarine. Designed as a supply submarine specifically to operate in support of reconnaissance seaplanes and flying boats, the SH Type was discontinued after one vessel. The *I-351* was over 360ft long with a submerged displacement of over 3500tons. It could carry 390 tons of cargo and 395 tons of aviation fuel to support intended operations. Due to a lack of typical submarine armament, four mortars were installed instead of a deck gun. The SH Type was the only supply submarine fitted with torpedo tubes although there were only four torpedoes available for use.<sup>109</sup>

#### Aircraft Carrying Leviathans

The Japanese Navy realized the necessity of good intelligence through reconnaissance assets. This was proven by the number of Type A and Type B aircraft

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<sup>108</sup>Ibid., 30.

<sup>109</sup>Bagnasco, 198.

carrying submarines built in the interwar and early war periods. The usefulness of submarine scout plane flights to support offensive action through target observation either prior to (e.g. Sydney and Madagascar) or after (e.g. Pearl Harbor) drove the Japanese to develop two further types of aircraft carrying submarines. Both the Modified A and *Sen Toku* type submarines were enormous submarines for their era.

The A Modified Type submarine was the second largest submarine design in the Japanese Navy until the advent of the *Sen Toku* Type. Even at over 370ft long and over 4700 tons submerged displacement, there was minimal increase in operational range at 21000nm at 16 kts on the surface. The design was a modification of the A Type command submarines enlarged to carry two scouting aircraft. The Intended for reconnaissance operations, the type evolved to consideration in strike and kamikaze raid planning. Both submarines in this class were completed with snorkels with the first unit entering service at the end of 1944.<sup>110</sup>

The *Sen Toku* Type was a massive submarine at over 400 feet long and over 6500 tons submerged displacement. Also referred to as the *I-400* class, these submarines would not be overtaken by a single submarine in length and displacement until the nuclear-powered USS *Triton* (SSRN-586) in 1959.<sup>111</sup> They boasted a 37,500 mile range at 14kts and eight torpedo tubes. The *I-400* class submarines were built for reconnaissance and strikes on the American mainland. This was changed to a single strategic strike on the Panama Canal to cut the shorter Allied transit route of forces from the Atlantic to the

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<sup>110</sup>Polmar and Carpenter, 110.

<sup>111</sup>*Triton* was a single ship class of submarine. The first true class of submarines that was larger in length and displacement was the *USS Ethan Allen* class of ballistic missile submarines in 1961.

Pacific. They each carried three specially-designed *Seiran* type large floatplane bombers. The Japanese Imperial Headquarters Staff initially balked at building these large vessels due to the number of losses of the large Japanese submarines. The insistence of Admiral Yamamoto for the necessity of the Panama Canal strike caused the development of the class to continue.<sup>112</sup>

The *I-400* class included numerous questionable advances in its large frame. The first is the size itself. While it provided significant internal volume, it only carried 20 reload torpedoes for its eight torpedo tubes. This is a smaller number of reload weapons than the American *Gato* class that was almost a third of the displacement. The small number of reloads does not support the long range of the craft. The installed snorkel provided the ability to operate diesel engines while submerged, but the arrangement of the ventilation system only allowed the auxiliary engines to operate in this condition. Full battery charging would still require the submarine to surface. The class did have a sound dampening hull treatment that consisted of a sand or rubber foundation covered by a thin coating of plastic or cement. While this was an attempt to counter the Allied sonar systems, the sheer size of the vessel negated the possible advantage of the coating. For all the advances in the class, it used riveting instead of welding and other generally poor or careless construction techniques. Only three of eighteen planned *Sen Toku* Type submarines were built.<sup>113</sup>

Two *Sen Toku* and two A Modified Type submarines were completed as planned. A third *Sen Toku*, *I-402*, was converted to a supply submarine (specifically for the

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<sup>112</sup>Treadwell, 120; Compton-Hall, 66,71.

<sup>113</sup>Treadwell, 118; Compton-Hall, 71.

transport of oil) during building and did not carry aircraft. When the aircraft carrying *Sen Toku* Type submarines were completed, the progress of the war had left the Japanese with little fuel available for training or testing. The first missions of these two huge submarines were to Manchuria to retrieve fuel. The attack on the Panama Canal was cancelled and the four aircraft carrying behemoths were assigned to carry out a raid on the anchorage at the Ulitihi Atoll. The *Seiran* bombers were to be employed as kamikazes against American carriers anchored at the atoll. The attack was scheduled for 17 August 1945, and was cancelled when hostilities ceased the day before the attack. These five submarines accounted for over 29,000 tons of construction displacement.<sup>114</sup>

### Nimble Hot Rods

During the interwar period, the Japanese had developed and built a submarine known as *No. 71*. This lone experimental submarine was notable for the high submerged speeds that it attained. The *No. 71* was 140 ft long and had a submerged displacement of 240 tons. While in operation, *No. 71* was the world's fastest undersea craft able to operate at 21.25 knots. The Japanese did not capitalize on the experience gained in 1938 until they started development of the ST and STS Types of submarine.<sup>115</sup> These classes would not go into service until early and mid 1945 respectively.

The ST Type, also known as the *I-200* class, had a 1450 ton submerged displacement on a 259ft length. While the ST Type could travel 135nm at 3 kts submerged, the maximum submerged speed was 19 kts which could be sustained for 55

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<sup>114</sup>Compton-Hall, 79.

<sup>115</sup>Polmar and Carpenter, 100.

minutes followed by another 12 hours at 3kts. Maximum range was 8500nm at 11 knots on the surface. A maximum submergence depth of 360ft made the ST Type the deepest operator of all Japanese submarines.<sup>116</sup> The ST Type had recessed deck fittings and hinged covers for the camber holes to maintain the streamlining of the sleek hull form supporting the underwater speed. The streamlining also had the added benefit of decreasing underwater flow noise thereby decreasing the effectiveness of Allied sonar. The hull form had inherent dynamic stability without the use of control surfaces. This feature alone decreased the risk involved in high-speed submerged operations. A snorkel system allowed the submerged recharging of the batteries. A German *Balkon* sonar array was wrapped around the bow of the vessel. This system was one of the most advanced produced in World War II and would have greatly increased the effectiveness of the submarine in submerged attacks.<sup>117</sup> The combination of speed and other design features would make the ST Type a challenge for American ASW forces to contain. Three of 24 ordered units were completed.

The STS Type, also known as the *Ha-201* class, was a class of small submarines of 493 ton submerged displacement on a 173ft length. The STS Type had a maximum submerged speed of 13.9kts although her submerged endurance was only 100nm at 2kts.

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<sup>116</sup>Polmar and Carpenter, 116. The importance of underwater speed is most simply understood when the required search area for a 19kt submarine is compared to the same for a 4kt submarine. As a submarine dives to avoid an enemy combatant, the search area for it is described by a circle centered at the dive point with a radius defined by the speed of the submarine. Fifteen minutes after diving, the search area for a 4kt submarine is slightly over 3 square nautical miles while the 19kt submarine is already greater than 70. After another 15 minutes, the 4kt submarine stands at over 12 square nautical miles while the 19kt boat is in an area of uncertainty of over 280 square nautical miles.

<sup>117</sup>Schratz, 205-206; Friedman, 42.

Maximum range was 3000nm at 10kts on the surface. The class used a streamlined hull form similar to the ST Type and had a snorkel system installed. The STS Type was envisioned as a small, high-speed submarine to defend the Home Islands from enemy naval units. Ninety of these submarines were ordered but only nine were completed.<sup>118</sup>

Both of these classes of high-speed submarines were the only ones (midget submarines excepted) that utilized all welded construction. Numerous prefabrication techniques decreased the total build time of these submarines. The ST Type ended up requiring only ten months of build time for each unit, while the STS Type only required three months. The German Type XXI “Elektroboote” was the only boat to surpass the submerged speed of the ST Type during the war while the STS Type only lagged these two. The speed was still great enough to quickly outrun the range of operational Allied sonars. In fact, in heavy sea states, these vessels could outrun destroyer escorts forced to slow for the weather.<sup>119</sup>

None of these twelve submarines conducted an operational patrol prior to the cessation of hostilities. The promise of these two classes of submarine was great. The ST Type, in particular, had a potentially lethal combination of speed and range that could have thwarted Allied ASW efforts and attacked the American carriers thousands of miles from Home Islands. As it was, the ST and STS Types arrived too late to have an impact and the American Navy would not fully understand the consequences of submarines with high, sustained submerged speed until testing their own experimental *USS Albacore*

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<sup>118</sup>Polmar and Carpenter, 126.

<sup>119</sup>Friedman, 58; Ulrich Gabler, *Submarine Design* (Koblenz, Germany: Bernard and Graefe Verlag, 1986), 12-13, Specification Sheet 1.



(AGSS-569) in 1955 and 1957.<sup>120</sup> The delay between the testing of *No. 71* and the arrival of the ST and STS Type submarines allowed a weak point in ASW tactics to remain unexploited.

### Consequences of the Building Program

When the total tonnage of the supply submarines and large aircraft-carrying submarines is considered, over 73,500 tons of building capacity was expended in their creation. This is a considerable amount of tonnage when the resulting 55 vessels only had six that had torpedo tubes making them nominally capable of offensive or defensive operations. Had the same amount of tonnage been applied to B Type scouting submarines or C Type attack submarines, 20 combatant submarines would have joined the fleet. Had the Naval Staff chosen to leverage technology and build ST Type submarines with the tonnage, 50 combatant submarines would have bolstered the fleet.

With the development of the *unpoto* and *unkato* supply systems, it was not necessary to design submarines specifically to conduct supply operations. The D1 Type only offered a small improvement in supply carriage tonnage over the B Type scouting submarines when they removed their scout planes. The larger D2 Type submarine only doubled the supply capability of a B Type scouting submarine. Both of these classes sacrificed all of the offensive and defensive punch of the B Type scouting submarines and C Type attack submarines without a complementary increase in the supply capability. The large Japanese submarines were capable of carrying *daihatsu* and *unpoto* landing

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<sup>120</sup>Robert P Largess and James L. Mandelblatt, *USS Albacore: Forerunner of the Future* (Portsmouth, NH: Portsmouth Marine Society, 1999), 78-79, 90-91.

craft and towing *unkato* supply cylinders to increase their ability to support operations while retaining other valuable offensive and defensive traits.

The use of nearly half of the tonnage that is under consideration for five boats that never performed their intended mission confirms the tenacity of the opposition of the Naval Staff to contributing assets to building these behemoths. The cancellation of a number of these construction projects at significantly less than the ordered amount was due as much to a lack of raw materials as to the conclusion of combat. The suspension of building of the supply and large aircraft-carrying submarines highlighted the ultimate realization that the intent of these vessels was flawed, and represented a waste of material and personnel in a series of fruitless pursuits. The logistic role had taken a heavy toll on the submarine force accounting for the loss of at least 25 submarines in these operations.<sup>121</sup>

The development of high-speed submarines represented a significant opportunity to revolutionize submarine warfare and outstrip the capabilities of the ASW forces of the era. Allied ASW forces were used to facing a foe that had limited underwater endurance coupled with limited underwater speed. In general, a submarine could stay submerged for 24 hours operating at four knots and thus only transiting 90-100 nautical miles. If the same vessel tried to initially evade at its highest submerged speed of eight or nine knots, it would quickly deplete its battery capacity in approximately an hour. The ST Type could open distance from an ASW vessel quickly without depleting its battery completely. It could then use the snorkel to recharge the batteries to allow continued submerged operation. During post war testing, the *I-203* was estimated by its American

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<sup>121</sup>Polmar and Carpenter, 30.

prize crew captain to be able to operate on the battery for week without using the diesel engines to recharge.<sup>122</sup> Thus the ST Type, along with the German Type XXI, represented some of the first steps towards true submarines.

### Midgets and Suicide Torpedoes

Midget submarines had played a role in Japanese planning from the genesis of the ~~“decisive battle”~~ plan. Originally intended as opportunistic forces operating in the vicinity of the ~~“decisive battle,”~~ their role changed to covert harbor attack. They were carried by five of the submarines during the attack on Pearl Harbor. They were taken to Australia and the Indian Ocean to carry out attacks inside Allied harbors. These initial A Type Target submarines were not intended for sacrifice of the crew. They were intended for recovery and reuse. Ultimately these midgets submarines were removed from use on submarines and moved to coastal defense teams for the defense of Okinawa, the Philippines and the Japanese Home Islands.<sup>123</sup>

Recognizing a value in numbers, the Japanese designed and built more midget submarines. The line of midgets advanced from the A Type Target through B, C, and the *Koryu* (also referred to as the D Type Target) and *Kairyu* types. The A through D Type Targets advanced in size from 46 to 59 tons and the crew size increased to a maximum of five. Diesel engines were installed starting with the B Type for at-sea battery charging. The *Koryu* was considered to be an extremely advanced midget that had a crew of five people and was armed with two torpedoes or a single fixed warhead. The majority were

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<sup>122</sup>Schratz, 211-212; Gabler, 12.

<sup>123</sup>Compton-Hall, 141.

torpedo-armed allowing for attacks on multiple targets and re-use. The class had a 1000nm range and could operate submerged for up to 50 hours. Some *Koryu* even had radars mounted onboard for target acquisition. The primary employment of some of these vessels was for the training of *kaiten* pilots.<sup>124</sup> The *Kairyu*, being smaller at 20 tons, was less capable and was only armed with the fixed warhead. The *Kairyu* preceded the *kaiten* as the first submarine weapon designed with the intent of being a suicide weapon.<sup>125</sup>

Sixty-two A Type Target submarines were deployed and had marginal success (two ships sunk, two damaged) with the loss of all 23 used in Pearl Harbor, Sydney, Madagascar, Guadalcanal, and the Aleutians. Only sixteen B and C Type Targets were built with eight lost in operations around the Philippines for no successes. A total of 115 *Koryu* were built (out of 540 planned) along with 244 *Kairyu* (out of 760 planned), but neither was able to have an impact comparable to the A Type Target submarines. Hundreds of these midget submarines were sitting in various stages of assembly in 22 different shipyards when Japan surrendered. These two types never had the opportunity to counter assaults onto the Home Islands.<sup>126</sup>

The final midget submarine developed by the Japanese was the *kaiten* torpedo. Serious consideration of the use of an operator-guided weapon occurred after the poor results of the submarines in action around the Solomon Islands. This weapon only had a crew of one and was based on the propulsion plant of the “Long Lance” torpedo combined with a operator station and a 3,400lb warhead. These manned torpedoes had a

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<sup>124</sup>Polmar and Carpenter, 134; Bagnasco, 200-201.

<sup>125</sup>Compton-Hall, 141.

<sup>126</sup>Polmar and Carpenter, 130, 133-135.

23 kilometer range at 30kts and a 10 kilometer range at 40kts. While impressive, these numbers were somewhat specious as these ~~“guided”~~ weapons were essentially blind when travelling at these speeds. To use the installed periscopes, the *kaiten* had to be near the surface of the water and travelling at a slow enough speed to not leave a wake that could be detected. Generally, this speed was less than ten knots. When travelling faster, the *kaiten* had to be deeper and the pilot was forced to rely on a compass to continue his attack.<sup>127</sup>

Between four and six *kaitens* could be carried on submarines converted to be ~~“mother”~~ ships. Some submarines were converted after building was complete to include many B Type scouting submarines that had their scout plane hangars removed and D1 Type supply submarines. Some submarines were modified during construction although none were purposefully designed for this role. Ultimately, any surviving oceangoing submarine was used as a *kaiten* carrier. Each *kaiten* did have an access port which provided the opportunity to abandon the craft before impact, but based on the size of the warhead, the pilot would not have survived the explosion if he was in the water. The access did allow the pilot to board the *kaiten* while the host submarine was still submerged instead of requiring it to expose itself on the surface.<sup>128</sup>

Based on the necessity to slow to avoid counter-detection during an attack, the use of *kaiten* may have actually decreased the possible engagement envelope of the attacking submarine. The need for security certainly negated the range advantage of the weapon because of the speed disadvantage during the times for observation. The shortened

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<sup>127</sup>Bagnasco, 200-201; Compton-Hall, 142.

<sup>128</sup>Bagnasco, 201; Compton-Hall, 141.

engagement envelope was countered by the potential for increased accuracy based on the ability of the pilot to adjust track towards the target.

### Strategic and Tactical Changes

As previously mentioned, the most significant change in the Japanese strategy for employment of their submarines was the decision in mid-1942 to focus on commerce raiding. The shift to commerce raiding coincided with the start of operations in the Indian Ocean and around Australia that were intended to force a “decisive battle” at Midway. The ability to conduct commerce raiding in concert with attempts at the “decisive battle” suffered from a lack of assets. The dilution of available combat power was most evident at Midway when submarines were committed to operations around Australia, the Aleutian Islands, and the Indian Ocean. The significant reversals at Midway and Guadalcanal overshadowed the decision to focus on commerce raiding. Commerce raiding quickly fell back to a minor aspect of submarine operations almost as soon as it had been moved to the forefront.

This is not to say that the Japanese endeavor at commerce raiding was unsuccessful. Commerce raiding was effective for the short period of time when it occupied the primary role for the submarine force. From April through June of 1943, two squadrons devoted their submarines to commerce raiding. The eight submarines of Squadron 1 and Squadron 3 conducted commerce raiding operations in the South Pacific. These patrols resulted in sinking or damage to 15 vessels for the loss of only *I-178*. Squadron 7 also attempted to focus on commerce raiding during the second quarter of 1943 but had many of its eight submarines diverted to rescue operations. The tally for Squadron 7 ended at two ships sunk for the loss of *RO-34* and *RO-102*. The divergent

results of Squadron 1 and 3 against Squadron 7 show the possibilities inherent in focusing on a single primary area of employment. Squadrons 1 and 3 focused on commerce raiding and reaped results while Squadron 7 struggled with split employment and diverted forces.<sup>129</sup>

One area of Japanese submarine operations was devoted to commerce raiding for its entire existence. During the entire period of operations in the Indian Ocean, Squadron 8, consisting of no greater than eight submarines, focused the majority of its effort on commerce raiding. The initial five submarines sank twelve ships with no losses. In 1943, the number of active (not in overhaul) submarines in the Indian Ocean varied from three to six. With this small number of submarines, the single-minded effort at commerce raiding still resulted in 23 ships sunk and a further six damaged. During this time, no Japanese submarines were lost. While the results were impressive when compared to the greater operations in the Pacific, especially when the number of submarines employed in each theater is considered, the dearth of Allied anti-submarine assets in the Indian Ocean played a role in the Japanese successes. The singular operational focus of the assets in the Indian Ocean, combined with a geographic focus at the southern outlet of the Red Sea, did result in noteworthy success against shipping.<sup>130</sup>

The reduction of commerce raiding as a priority was nearly coincident with the rise of submarines as a supply asset in the role of the commerce they desired to destroy. The focus on supply operations, which were referred to as *mogura* or “mole” operations, started with the effort to reinforce and then evacuate the garrison on Guadalcanal. Even

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<sup>129</sup>Boyd and Yoshida, 114-115.

<sup>130</sup>Boyd and Yoshida, 111, 116-117, 123-124.

after significant numbers of purpose built supply submarines entered the fleet, fleet and cruiser submarines continued to conduct —moñ operations instead of regular offensive or defensive roles. Included with these overt operations to supply garrison troops, submarines conducted numerous operations to support reconnaissance efforts at Pearl Harbor and other American bases.

The Japanese maintained numerous tactical procedures that influenced their operational potential. First is the normal attack methodology of the force. The Japanese focused on submerged attacks starting with penetrations of defensive screens based on interwar training. Maintaining significant time submerged increased the tactical security of the individual submarines but consequently limited their mobility based on the challenge of managing underwater speed and battery capacity. The limited mobility (and limited visibility of periscope depth level searches) curtailed the ability of the submarines to search for viable targets. The German and American submarine forces operated counter to the Japanese style. Both spent the majority of their time on the surface conducting searches for targets. They took advantage of the higher speed and better visibility during surface operations and relied on their diving ability to protect them from patrol aircraft and other threats. While the Japanese preferred daylight attacks to support submerged operations, the Germans and Americans preferred to attack at dawn or dusk to take advantage of poor visibility for the target allowing the attacker to remain on the surface.<sup>131</sup>

A handful of design and equipment issues influenced the choice of submerged versus surfaced primary operations. Diving speed enabled the primacy of surfaced

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<sup>131</sup>Schratz, 206.



operations because of the ability to gain security in depth. Because the Japanese submarines were generally larger than the vessels of other countries, they had slower diving speeds. Along with the slower diving speeds, the Japanese submarines also had larger silhouettes making them more visible to other vessels when operating on the surface. Both of these factors encouraged a dependence on submerged operations. The capability of the torpedo fire control system onboard the submarine would also influence the choice of primary operating depth. The Japanese system was simpler than the American version and was considered incapable of dealing with rapidly changing or multiple target scenarios that were more common in surfaced operations.<sup>132</sup> The inclusion of the snorkel mast also encouraged operation below the surface because it negated the need to surface to recharge batteries.

The focus on submerged operations had both positive and negative consequences for the Japanese. When the Japanese were on the offensive early in the war, submerged operations limited the influence of the submarine force. As such, the Japanese submarine force failed to take advantage of the momentum of the early operations and did not build on the results being created by the Japanese Naval Air Forces. The submerged focus did, however, enable some of the significant interactions (e.g. sinking of *Yorktown* and *Wasp*, damage to *Saratoga*--twice) because of the pre-war experience in screen penetration during exercises. Later in the war, the submerged operations suited the defensive efforts of the submarine force because it increased tactical security as the Japanese tried to maintain the strength of the force by limiting attrition. It also suited the “mole” operations since the supply submarines were ill-equipped to stand and fight if caught on

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<sup>132</sup>Ibid.

the surface. Had the *Sen Taka* and *Sen Taka Sho* Type submarines entered the fleet sooner and in greater number, the broad experience with submerged operations would have allowed the quick assimilation and employment of these vessels.

Besides the method of attack generally performed, the tactical arrangement of the submarines in support of operations also had an influence on the effectiveness of the Japanese submarines. In each operation that employed submarines, the vessels formed scouting, or patrol, lines. While the name of the line conjures visions of movement and flow, the Japanese interpretation tied each member of the line to a specific geographic spot with little freedom to maneuver. While not an issue by itself, in combination with the significant distance that the lines spanned (e.g. 600 mile front for the 13 submarines arrayed across either side of the Hawaiian Island chain in support of the Midway operation), the fixed nature of the submarine assignments made the line ineffective at performing the desired early warning and interdiction roles.<sup>133</sup> The American and German employment of their submarines differed considerably from the Japanese. The Americans and Germans both employed patrol areas instead of scouting lines. The Germans used a grid structure that encompassed the entire Atlantic Ocean while the American system encompassed the major operating areas. When temporary scouting lines

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<sup>133</sup>For the Midway lines in the example, the 13 submarines would have been separated by approximately 50 miles each. As the maximum visibility would have been in the vicinity of 10 miles in any direction, there would have been approximately 30 miles of the line between each submarine that could not be observed. This equates to nearly 360 miles of the 600 mile line that would have been unobserved.

were used, the American submarines were closely spaced and free to maneuver to effectively search the assigned area and minimize gaps in coverage.<sup>134</sup>

Coupled with the rigid scouting line structure was a tightly controlled command structure. The operations were all controlled from a central point. In reference to the Sixth Fleet, the commander gave direction from a forward base that was initially at Kwajalein, moved to Truk, then Saipan, before settling in the Home Islands. The staff response to observation from the scene was either to disregard or overreact to it. The commander deployed the submarines to geographic points without much freedom of movement. The distant command and control structure exacerbated weak strategic reconnaissance capabilities that were made worse by the rigid geographic assignment of submarine assets. The Germans used a similar command and control style as the Japanese with all movements strictly controlled by Admiral Karl Doenitz. The major difference was the reliance of Germans on the aggression and imagination of the commanding officers by assignment to patrol areas. Doenitz organized “wolfpacks”(groups of submarines operating in unison against a single target) to focus combat power on specific convoys at specific geographic areas. These “wolfpacks” were both temporary in nature and fluid in composition but still largely controlled by a distant commander and subject to control and intelligence shortcomings of the method of command. The Americans further evolved the “wolfpack” methodology by assigning the involved submarines for longer periods of time and placing the commander on one of the submarines in the group. In this way the American “wolfpack” coordinated on the scene and could more quickly

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<sup>134</sup>Polmar and Carpenter, 47; Doenitz, 21-22; John White, *U-Boat Tankers, 1941-1945: Submarine Suppliers to the Wolf Packs* (Annapolis, MD: Naval Institute Press, 1998), 19,29, 236.

react to the situation as it changed based on direct observation. The Japanese never implemented any form of “wolfpack” operations.<sup>135</sup>

The Japanese struggled to put worthwhile procedures in place after the need to address tactical security was identified in the exercise of October 1940. Like the Germans, the Japanese command structure required significant amounts of radio communication between the commander and the submarines. The heavy flow of traffic increased the risk for both navies. Because of the compromise of Japanese codes, American forces were able to operate ahead of their Japanese counterparts and conduct attacks without warning. A prime example that occurred in operations around the Marianas Islands will be discussed in the next chapter. The lack of tactical security, specifically communications, in operations was also apparent in the loss of the *I-1* described previously. Lack of variation in operating patterns made the Japanese predictable and allowed the Allies to anticipate the movements of submarines conducting “mole” operations in the same way they were able to avoid submarines forming the cordon effort around Pearl Harbor after the attack.

A final interesting change within the Japanese submarine force was the replacement of the Sixth (Submarine) Fleet commander by an officer two Naval Academy classes junior to him. The norm in succession had the successor come from the same or following Academy class.. With this change, the replacement of all subordinate Squadron and Division commanders followed a similar movement toward youth. The goal of these changes was to bring fresh thought and a less rigid structure to Japanese

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<sup>135</sup>Doenitz, 20-22; John Keegan, *The Price of Admiralty: The Evolution of Naval Warfare* (New York: Viking Press, 1989), 223-225; Charles Lockwood, *Sink 'Em All: Submarine Warfare in the Pacific* (New York: E.P. Dutton, 1951), 87-88, 122-124.

operations. The pace of American operations did not allow the Japanese to take advantage of these changes however.<sup>136</sup>

### Conclusions from Tactical and Technological Changes

The Japanese building program during the war struggled to maintain the force level of operational submarines through the course of the war with little success in increasing it to take advantage of their momentum and success early in the war. Crucial shipbuilding assets were expended on units of questionable value. The extremely large *Sen Toku* and Type A Modified boats provided no benefit to the Japanese war effort due to the extremely long gestation time of both classes as well as their lack of flexibility of use. They were too large to conduct operations as traditional fleet type submarines in defense of the dwindling Japanese assets. The four boats combined could only muster ten aircraft for a single attack. The offensive capability resident in the *Seiran* bombers that these boats embarked was not sufficient to have the impact the Japanese command desired.

The supply boats also taxed the limited shipbuilding capability of the Japanese without providing any combatant capability. The usefulness of these designs was questionable even before being built based on the poor results of the repurposed submarines used at Guadalcanal. The supply submarines were incapable of being

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<sup>136</sup>Boyd and Yoshida, 120. The shift towards youth was not unique to the Japanese submarine force. The interesting characteristic was that the youth movement focused higher in the command structure than elsewhere. In the American submarine force, for example, the movement towards youth occurred at the submarine commanding officer level vice higher. It would appear that the Japanese were looking for new ideas in their planning and operational levels while the Americans desired an adjustment in the tactical performance of their submarines.

repurposed to significant offensive or defensive operations (even when *kaiten* torpedoes were carried on deck).

The most promising of all the new build submarine classes were those of the *Sen Taka* and *Sen Taka Sho* types. The high submerged speed coupled with the large battery capacity made a large step toward a true submarine. These vessels had the potential to take advantage of the Japanese experience with operating submerged and increase the number and impact of their attacks. In the end, the technological experience gained with the *No 71* experimental submarine was not employed early enough to produce sufficient numbers of *Sen Taka* and *Sen Taka Sho* submarines in time to influence combat in the Pacific Ocean. Ultimately, the advances inherent on the *Sen Toku* and *Sen Taka* type submarines show that the Japanese submarine force stayed at the forefront of submarine technology. The Japanese maintained the advantage through sleeker hull forms allowing higher speed as well and automatic systems that support the operation of massive submarines. The introduction of snorkel systems expanded the operating envelope of the Japanese submarines by increasing the ability of the submarines to remain submerged.

Strategically, the shift to commerce raiding was a façade that quickly succumbed to actual events in the Pacific Ocean. The change was unsustainable as Japanese forces lost the offensive momentum to the Americans. Even with the recurring commitment to “decisive battle,” the haphazard employment of the submarines failed to take advantage of the technical capabilities of the submarines in the fleet. The Japanese submarine employment continued to follow rigid guidelines regardless of operational experience. Prewar exercise experience in operational security was also imprudently ignored. Even

with the shift to younger commanders, the Japanese failed to adapt and improvise as they remained limited as a force subordinate to the goals of the surface fleet.

## CHAPTER 5

### ANYTHING TO STOP THE BLEEDING: LATE SOLOMONS TO SURRENDER

A submarine . . . sighted an enemy task . . . [and] failed to attack. It is most regrettable. I am beginning to feel that the words of those who say the submarine is only good for raiding operations and scouting are almost admissible. I wish they would strike enemy warships even once just to disprove them.

Admiral Matome Ugaki, *Fading Victory*

Failing to reach the goal of winning a “decisive battle” at Midway or Guadalcanal, the Japanese continued to focus on hunting for the elusive striking victory.<sup>137</sup> The Japanese submarine force was riding a wave of success as they had had some influential sinkings during operations around Guadalcanal. The combat power of Japanese submarine force was diluted through numerous commitments in the Indian and Pacific Oceans and the crest of submarine success was passing. The Sixth (Submarine) Fleet would embark on a series of campaigns to attempt to stunt the ever present advance of American forces across the Pacific.

#### Retreat from the Aleutians

The Japanese Navy viewed the occupying forces on the islands of Attu and Kiska in the Aleutian chain as an impetus to draw significant American forces into the area for a potential precursor to the “decisive battle.” In early 1943, the Japanese had seven submarines of varying capabilities operating in the Aleutians. Six of these were medium range RO-class boats. The Japanese detected American Admiral Thomas Kinkaid’s

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<sup>137</sup> Admiral Matome Ugaki was the Chief of Staff to Admiral Yamamoto for the Combined Fleet. He would later command the Kamikaze campaign against the U.S. forces invading Okinawa.



invasion fleet transiting towards the area in May 1943. With the departure of all Japanese surface forces because of significant losses in the Battle of the Komandorskis (27 March 1943), submarines were left as the final challenge to the American invasion and the single source of supply to the garrisons. Two submarines, *I-31* and *I-35*, managed to penetrate the protective screen of the invasion fleet, but they were unable to take advantage of the position and sink anything. Both boats survived the effort even though *I-35* would soon be damaged and *I-31* sunk.<sup>138</sup>

Admiral Mineichi Koga, successor to command of the Combined Fleet when Admiral Yamamoto was killed, believed that a “decisive battle” in the near future was the sole chance for success of the Japanese Navy. Sensing the opportunity for a major battle that could weaken American combat power, eight further submarines were rushed from the Central Pacific to the Aleutians. The submarines transferred to support operations in the Aleutians were not equipped for cold weather operations. All submarines needed to return to their home bases in Japan simply to swap clothes and other items to protect personnel in cold weather. The submarines lacked radar to assist in operations in the reduced visibility regularly encountered. This compounded the threat of enemy action with the threat of navigational problems caused by persistent fog and harsh weather.<sup>139</sup>

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<sup>138</sup>Parshall and Tully, 475; Boyd and Yoshida, 118. The Battle of the Komandorski Islands was an unusual battle conducted by surface combatants without any air or submarine activity. In the battle, a small American surface force stopped a numerically superior Japanese surface force from conducting resupply of the Aleutian garrison forces. The Japanese subsequently pulled all surface forces from the Aleutians. The battle is considered the last pure naval gunnery battle.

<sup>139</sup>Parshall and Tully, 476; Polmar and Carpenter, 34-35; Boyd and Yoshida, 110.

Eight submarines would be committed to supply operations before the decision was made to abandon the islands. With this decision, thirteen submarines took on the role of evacuation transports. At this point in the war, two-thirds of available submarines were committed in supply or defensive roles throughout the Pacific Ocean. Fifteen successful supply/evacuation runs were completed to Kiska, providing 125 tons of supplies and retrieving 820 soldiers. The supply and evacuation operations led to the loss of three submarines in two weeks. The commander of the operation allowed no further direct participation of submarines based on these results.<sup>140</sup>

With the abandonment of supply and evacuation operations, submarines in the Aleutians continued to support the campaign mainly through reconnaissance missions. The final cost of submarine operations in the Aleutians was steep. American forces sank five submarines: *I-7*, *I-9*, *I-12*, *I-24*, and *I-31*. Two submarines, *I-2* and *I-157*, ran aground and were lost for further operations. Exemplary of the unique conditions of the area of operations, *I-155* sustained severe damage in a storm and returned to Japan. For the commitment and loss of so many submarines, the Japanese failed to sink any ships, nor did they slow the invasion of Attu and Kiska. The lone positive result for the submarines was the small number of experienced pilots that were evacuated to return to Japan for reassignment.<sup>141</sup>

The failure of the submarines to stop, or even slow, the American invasion in the Aleutians was a result of the poor employment of the vessels. The submarines sent to the

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<sup>140</sup>Orita and Harrington, 150; Polmar and Carpenter, 35; Boyd and Yoshida, 118-119.

<sup>141</sup>Boyd and Yoshida, 119; Polmar and Carpenter, 35.

Aleutians lacked proper equipment to allow them to operate there successfully. They were not organized to focus their combat power on the invasion fleet. They were tasked to conduct a mission for which they were ill suited and untrained. The fact that the submarines were not released from this operation immediately once it became an evacuation mission is unconscionable when one considers that the force was already stretched thin across two oceans.

The number of losses in the harsh conditions of the Aleutians did drive a change in the policy of the Naval General Staff with respect to radar. Prior to these losses, both to enemy action and navigational issues, the Naval General Staff did not view the inclusion of radar on submarines as a priority. After the Aleutians campaign concluded, all submarines were ordered to be fitted with radar immediately.<sup>142</sup>

### Operations in the Indian Ocean

The lack of a concerted anti-submarine effort by the Allies allowed Japanese submarines to continue to roam free in the Indian Ocean. Early in 1943, the force of eight submarines was limited to three by the need for overhauls. These three subs still managed to sink seven ships while damaging another. As 1943 continued, six active submarines were able to sink sixteen vessels while damaging a further five.<sup>143</sup>

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<sup>142</sup>Hashimoto, 150. The inclusion of radar on submarines had not been avoided to this point, it simply did not occupy a priority for the Naval General Staff. At the time that submarines were operating in the Aleutians near the end of the campaign, Cdr Mochitsura Hashimoto's newest command, I-158, was conducting radar testing near the Home Islands. Progress was slow and the general results were poor, but efforts to bring about the inclusion of radar on submarines was in progress by early 1943.

<sup>143</sup>Boyd and Yoshida, 116-117.

Operations in the Indian Ocean are unique because they marked the only time that German and Japanese forces conducted coordinated operations during the war. By the end of 1943, eight Japanese submarines and seven German submarines operated in the Indian Ocean along with various surface raiders and supply vessels. The Germans built their own submarine bases, such as Surabaya, Java, as the size of the Axis effort in the Indian Ocean was too large for the Japanese bases alone.<sup>144</sup>

Over time, the Allied anti-submarine effort in the Indian Ocean grew. With greater opposition, Japanese results started to dwindle. Large numbers of escorts arrived and protective measures were implemented for merchant vessels. Two submarines were sunk, *I-27* and *RO-110*, while the rest conducted a small number of successful patrols. In the first half of 1944, Japanese submarines sank a dozen vessels and damaged another to counter their two losses. As pressure grew in the Pacific, all submarines, except for two of the RO-class boats, were withdrawn from the Indian Ocean. From the middle of 1944 to the end of the war, only one more Allied merchant was sunk in the Indian Ocean by Japanese submarines.<sup>145</sup>

One of the few successful submarine patrols in the Indian Ocean in the first half of 1944 was completed by *I-8* commanded by Commander Ariizumi. Ariizumi led the *I-8* to four sinkings (although one was a small sailing vessel) but two of the sinkings show the result of the frustration of the failing Japanese war effort. The Dutch merchant

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<sup>144</sup>Polmar and Carpenter, 36-37.

<sup>145</sup>Boyd and Yoshida, 159-160; Polmar and Carpenter, 54.

*Tjisalak* and the American merchant *Jean Nicolet* were victims of *I-8*. The crew of *I-8* tortured and murdered nearly two hundred survivors from these two vessels.<sup>146</sup>

The Japanese submarine operations in the Indian Ocean provide clear evidence of their ability to conduct commerce raiding successfully. Their success in this theater must be understood in context however. The Indian Ocean was an extremely permissive environment for submarine operations due to the failure of Allied nations to commit sufficient anti-submarine effort to the theater. Once these assets arrived, Japanese successes decreased considerably. The pressures of the American advance in the Pacific also required the departure of most submarine assets from the Indian Ocean verifying its standing as a secondary theater of operations. The Japanese commitment to the area never grew past the high mark of eight. Had the Indian Ocean been more important to the war effort, more submarines would have been sent. The Indian Ocean instead acted to deprive assets from actions where they could have proved useful. While an interesting sidelight, the coordinated operations of the Germans and Japanese did not indicate that the Indian Ocean was a major theater of operations vital to any war plan.

The real importance of the Indian Ocean operations was twofold. First was the ability to train crews and ready them for the greater challenges of operations in the Pacific Ocean. Officers sent to boats in the Indian Ocean were able to expand on the knowledge gained in training through practical exercise. They were able to experiment and learn with minimal risk to themselves or their crew. Operations in the Indian Ocean

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<sup>146</sup>Polmar and Carpenter, 44. A small number of personnel from the *Jean Nicolet* survived the incident and after the war, trials brought about the execution of a number of the officers from *I-8*. Ariizumi took his own life during the return of *I-8* to Japan at the cessation of hostilities.

also proved the superiority of Japanese submarine design. The boats were able to take advantage of their long range and large size to conduct extended patrols covering large amounts of the Indian Ocean. They were able to cross the Indian Ocean with ease from their bases to conduct patrols at the southern terminus of the Red Sea. Their superior torpedoes also meant that most of the merchant sinkings were completed with a single weapon. Despite these positives, the Indian Ocean operations stood as an example of imprudent use of limited assets since no country's war effort was dependant on control of the Indian Ocean.

### Rollback in the South Pacific

As the American offensive continued in the South Pacific in the middle to late 1943, Japanese submarines continued to conduct *mogura* (supply) operations to re-provision cut off garrison troops. Even though Admiral Takeo Takagi, commander of Sixth (Submarine) Fleet, would promise a return to offensive operations when he took command in November 1943, numerous submarine commanders complained heavily about the continuation of supply operations with minimal offensive patrols before and after his arrival. Even though orders would come that started to task submarines with attacking American rear supply lines, supply operations occupied the primary mission in the Solomons.<sup>147</sup>

The distaste for supply operations did not cause the submarine commanders to devote less effort to them. Enterprising commanders recognized the Allied operating cycle and adjusted their operations accordingly. With the adjustments, Japanese

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<sup>147</sup>Prados, 563; Polmar and Carpenter, 35-36; Hashimoto, 130-131.

submarines spent more time submerged at night than before only coming up to charge batteries at dawn and dusk. The increased submerged time further limited the ability of a small force to search appreciable amounts of sea area in their adjunct reconnaissance tasking.<sup>148</sup>

As the commander of *I-177*, Commander Zenji Orita would complete fourteen supply runs from New Guinea to Rabaul. This was possible because the previously discussed ingenuity of commander and the predictability of Allied efforts. The boats preparing for transport runs were able to submerge in the harbor during the daily American attacks and continue loading during the remainder of the day. This counter to the predictability of the American attacks did not cause the Japanese to recognize the risk inherent in their own repetitive operations. Instead, the Japanese clung to their own repetitive and predictable cycle of operations in both supply operations as well as scouting operations.<sup>149</sup>

Even when they managed to survive the ever-increasing American air raids and anti-submarine forces, Japanese submarines were still not able to conduct offensive operations when conducting supply operations. Orders strictly forbade conducting torpedo attacks while on supply runs. The only exception was if the observed target was either a battleship or aircraft carrier. Even with the freedom to attack these ships, commanders would avoid these opportunities to complete the supply mission. Commander Mochitsura Hashimoto, when in command of *RO-44* near Mejuero, observed a number of battleships and aircraft carriers within a few hundred yards one night.

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<sup>148</sup>Orita and Harrington, 161-162; Hashimoto, 115-116.

<sup>149</sup>Orita and Harrington, 169,171.

Instead of pressing an attack with the torpedoes that he already had prepared, he chose to avoid action and not endanger his supply and reconnaissance mission. When admonished by his superiors on return from the mission, he simply responded that he did not want to endanger completing the mission.<sup>150</sup>

Submarines were moved *en masse* to the central Solomon Islands to counter the American invasions following the loss of Guadalcanal. Despite the large number of submarines employed, a very small number of ships were sunk. From late 1943 through early 1944, seven submarines were lost for a tally of only three sinkings. This did not mark an auspicious start to the newest re-focusing of the submarine effort to wear down enemy forces in the central and south Pacific Ocean.<sup>151</sup>

The American offensive into the Gilbert and Marshall Island chains was the first opportunity for Takagi to oversee the operations of the Japanese submarine force. Based on the large number of losses in Japanese surface and air forces prior to this offensive, submarines were the only forces available to counter the attacks towards Tarawa and Makin Islands. Nine submarines were available for assignment and they were moved immediately. The small number of submarines available for employment would limit the results of the effort as much as Takagi's lack of experience would. Takagi's assignment as Sixth (Submarine) Fleet commander followed the trend of assigning flag officers to

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<sup>150</sup>Hashimoto, 134-136.

<sup>151</sup>Boyd and Yoshida, 122-123.



this position even though they had little or no recent experience with submarine operations.<sup>152</sup>

The submarines formed picket lines on 19 November. The initial arrangement of the nine submarines formed five circles to create a layered defense. From 19 November through 30 November, picket lines were shifted on an almost daily basis with at least one instance of three shifts occurring in a two-day period. Takagi attempted to simulate a much larger force with the nine submarines that he had available. The submarines were put through a series of confusing and contradictory orders that involved high-speed surface runs and random radio transmissions to generate the ruse of a larger force.<sup>153</sup> The effectiveness of the Japanese submarine force to this point in the war did not support the ruse. Combined with the lack of a surface threat in the area and limited air assets, the American force was not deterred. The random movements and false transmissions only served to draw the submarines away from any real results while placing them at greater risk.

The only people that Takagi's simulation was able to influence were his own submarine commanders. Submarine commanders felt that Sixth (Submarine) Fleet's random orders placed the submarines at great risk and directly influenced the loss of six submarines out of the nine assigned to the area. The assignment of submarines failed to take advantage of the inherent strengths of the submarine as well as failing to cover their

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<sup>152</sup>Boyd and Yoshida, 124-125; Polmar and Carpenter, 36, 47. The majority of Admiral Takagi's experience was in battleships and staff work. He was the commander of the carrier task force in the Battle of the Coral Sea. He did command some small Japanese submarines in the early 1920s before the development of the major war plans and the introduction of the larger cruiser and fleet type submarines.

<sup>153</sup>Polmar and Carpenter, 36; Prados, 530.

faults. The submarines were not allowed to analyze their operating areas and adjust to the Allied operating cycle. Instead, the submarines were forced to expose themselves in high-speed surface transits at all times of day regardless of the threat.<sup>154</sup>

Operations attempting to defend the Gilbert Islands from invasion were costly. Six submarines were lost. These losses caused the Combined Fleet to avoid committing further submarine assets to the Marshall Islands area. While no submarine defensive operations were conducted in the vicinity of the Marshalls, the lack of surface assets ensured that the invasion force was unopposed at sea. Two submarines did conduct operations in the area, but they were tasked in a piecemeal fashion to recover aviators for later operations.<sup>155</sup>

For the cost of six of their own, the Japanese submarines operating in the Gilbert and Marshall Islands were only capable of sinking a single vessel. On 24 November, Lieutenant Commander Sunao Tabata, in command of I-175, sighted an American aircraft carrier. A full salvo of six torpedoes was launched at the target. The American escort carrier USS *Liscome Bay* sank twenty-three minutes after a single torpedo from the salvo struck. The loss of the *Liscome Bay* did not influence the American invasion of the Marshall and Gilbert Islands, but the manner of its sinking did underline the capability of the Japanese torpedoes. Loss of the Gilbert and Marshall Island chains also meant the loss of Kwajalein, the original forward base of submarine operations during the war.<sup>156</sup>

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<sup>154</sup>Orita and Harrington, 185-186.

<sup>155</sup>Boyd and Yoshida, 126.

<sup>156</sup>Polmar and Carpenter, 36.

During the time of operations in the Gilbert and Marshall Islands, the I-176 was assigned to conduct security patrols near the Japanese base at Truk. I-176 was not one of the nine boats assigned to the main effort to stop the invasion. During the course of the patrol, I-176 performed a unique event for the Japanese submarine force. On 16 November 1943, I-176 fired a salvo of three torpedoes at an American submarine. Two hits sank the USS *Corvina*. This would be the only loss of an American submarine to a Japanese submarine during the entire war. This finally gave the Japanese a submarine victory over an American submarine.<sup>157</sup>

The comparison of submarine versus submarine results is potentially dubious as an evaluation of effectiveness of different submarine forces in World War II. That being said some important things could be gleaned from the comparison. The Japanese submarine force sank three submarines, only one of which was American, as previously mentioned. The American submarine force sank twenty-three submarines and all but two of them were Japanese. The British submarine force sank 36 submarines. Of these 36, sixteen were German, eighteen were Italian, and the final two were Japanese. Of the 62 sinkings by Japanese, American and British submarines in submarine on submarine interactions, all but one had the target operating on the surface<sup>158</sup>

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<sup>157</sup>Ibid. The Japanese submarine force would only sink three submarines during the course of the war. One American, one Dutch, and one Russian submarine would fall victim to Type 95 torpedoes.

<sup>158</sup>Polmar and Carpenter, 48. The lone sinking of a submarine by another submarine where the victim was submerged occurred off the coast of Norway when *HMS Venturer* detected and sank *U-864*. Both vessels were completely submerged. Normally, submarine sinking by other submarines occurred while the victim was on the surface or in the act of diving or surfacing and therefore still exposed like a surface ship.

While the results of submarine on submarine action do not provide insight into any advanced tactics, the comparison of American and Japanese results against one another do indicate the opposing uses of submarines. Had the Japanese submarines been employed on offensive operations, their operations would not have been as scripted as the recurring supply runs that allowed them to be easily intercepted. The overdependence on communications up and down the command chain exposed the Japanese submarines to interdiction. The American submarines were less vulnerable based on the concern for operational security. The decentralized control of the American submarine force ensured far greater security in the execution of their assigned tasks. The American successes highlight the more open and offensive manner in which they were employed.

The actions in the Gilbert and Marshall Island chains spanned the closing of year. The year 1943 did not have the same level of success that submarine force enjoyed in the previous year. Twenty nine submarines were lost during the course of the year. Fifty six merchants were sunk at the hands of Japanese submarines. The majority of these were sunk in the Indian Ocean. Only a small handful of warships were sunk, none of which that could be considered major combatants. One escort carrier and one submarine were sunk. Two torpedo boats and a tank landing ship (LST) were also sunk. The only other success against a warship occurred against the Australian cruiser HMAS *Hobart* that was put out of action for seventeen months by a single torpedo hit.<sup>159</sup>

Japan started 1944 with the largest force of submarines available of any year during the war. The 66 operational submarines were divided between 42 large I-class boats and 24 medium and small RO-class and HA-class boats. The primary roles defined

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<sup>159</sup>Ibid., 42.

by the senior staff were merchant attacks and supply/evacuation operations. Supply operations would continue to dominate efforts.<sup>160</sup> Even with the favorable force size at the beginning of the year, the command structure that limited it was still firmly entrenched and would not change without the aid of a catastrophic setback.

### Losses in the Central Pacific and Operation A-Go

With the loss of the Gilbert and Marshall Island chains, the Japanese were forced to fall back further in their defensive posture. The Americans turned bases in the Marshall Islands into resupply and formation centers for further thrusts into the Japanese defenses. In an attempt to gain intelligence on American force structure and intentions, the Japanese sent eight different submarines on reconnaissance patrols into the Marshall Islands early in 1944. While no boats were lost in these attempts, they were all unsuccessful at penetrating the American anti-submarine screen and gathering any useful information.<sup>161</sup>

The loss of the Gilberts and Marshall Island chains exposed the Japanese naval bastion of Truk to concentrated attacks from both American air and surface assets. Submarines were specifically maintained in the Central Pacific to warn of American carrier movements. Ironically, these submarines failed to give any warning of attacks in February 1944 that crippled Japanese submarines' forward operations. During one raid, the submarine tender, and current fleet flagship, *Heian Maru* was sunk. With the sinking, the Sixth (Submarine) Fleet lost the majority of its repair parts and specialized

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<sup>160</sup>Ibid., 43.

<sup>161</sup>Boyd and Yoshida, 136.

equipment. The former flagship of the fleet, the cruiser *Katori*, was also sunk by American surface vessels as it tried to depart Truk. With these losses, the Sixth (Submarine) Fleet was forced to shift all submarine assets and repair/upkeep work to bases in the Home Islands. The forward command base for the submarines, which had moved to Truk when Kwajalein became untenable, was forced to move again. Takagi moved with his staff to Saipan to continue to coordinate operations.<sup>162</sup>

With the collapse of the Japanese defensive perimeter bounded by the Bismarck, Gilbert and Marshall Island chains, Operation *A-Go* was crafted as an attempt to stop the American advance into the area that the Japanese called the imperative zone. The operation was another attempt at a “decisive battle” to blunt the American drive through the Central Pacific. The plan presented an opportunity to follow classic Japanese pre-war doctrine. The Japanese Naval Staff held back assets from operations in the Gilberts and Marshalls intentionally in preparation for another “decisive battle.”<sup>163</sup>

The Sixth (Submarine) Fleet plan for Operation *A-Go* had two major divisions. The first part consisted of specific submarines assigned solely to a combatant role. The second part of the plan comprised the submarines not specifically assigned that would be routed as available to handle any crises and react to American weaknesses and penetrations. In order to allow coordination between air, surface and subsurface assets and prevent fratricide of surface ships by the submarines, a demarcation line was established to the west of Saipan. Japanese submarines were not allowed to conduct attacks to the east of this line. The new overall strategic plan associated with Operation

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<sup>162</sup>Boyd and Yoshida, 135; Polmar and Carpenter, 44-45.

<sup>163</sup>Boyd and Yoshida, 135.

*A-Go* ensured that the submarines were still subordinated to operations other than strictly offensive or defensive. The primary tasking still revolved around fleet support.<sup>164</sup>

In preparation for the next American thrust, Takagi arrayed the thirteen available submarines in two major groups. Three were east of the Admiralty Islands while the other ten were north of the Admiralty Islands. The arrangement of the submarines presupposed that the next American move would be directly towards the Philippines. The available submarines included seven new RO-class medium submarines that lacked experience in combat. The crews had not had the opportunity to complete some operations in the Indian Ocean for experience prior to fighting in the Pacific.<sup>165</sup>

The submarines assigned to the scouting lines were again arrayed to fixed points in the ocean with little leeway for movement to patrol. Takagi conducted numerous communications with the submarines on the line. The rigid employment of the submarines and lack of concern for operational security with regard to communications led to the near destruction of an entire scouting line in May of 1944 by a single American destroyer escort (USS *England*).<sup>166</sup>

The debacle of the *England* affair started with the Japanese decoding of an American scout plane report. Surmising that the plane's report was in reference to the position of *RO-104*, Takagi ordered a shift of the entire scouting line sixty miles from its original position. American intelligence assets decoded the orders from Takagi and provided the information to surface anti-submarine forces in the area.

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<sup>164</sup>Prados, 563; Boyd and Yoshida, 134-135.

<sup>165</sup>Polmar and Carpenter, 46.

<sup>166</sup>Prados, 563; Polmar and Carpenter, 47.

Anti-submarine assets were dispatched to the area of the scouting line. On 22 May, three vessels started to overrun the line encountering submarines at thirty-mile intervals. *RO-106* was sunk on 22 May. On the next day, *RO-104* was sunk. Both submarines were sunk by the *England*. On 24 May, *England* sunk the *RO-116* while failing to make contact with *RO-105* which was occupying the spot between *RO-104* and *RO-116*. *England* sank *RO-108* on 26 May and after a few days of searching *RO-105* was found and sunk on 31 May. Along with these five sinkings, *England* had also sunk the *I-19* while it was conducting a supply operation on 19 May. *England* ended the war as the most successfully anti-submarine vessel of the entire war. With six sinkings, *England* was responsible for the majority of the nine Japanese submarine losses in May 1944.<sup>167</sup>

While the *England* fiasco was a significant loss for the Japanese submarine force, there were a small number of small positives in it. The Japanese were able to break some of the messages sent by the *England* after its first few successes and recognize the threat to the line. Orders to *RO-109* and *RO-112* had them vacate the line and survive the run by *England*. The disastrous loss of five boats from this line alone also saw the Japanese finally change their employment scheme to patrol areas vice scouting lines.<sup>168</sup>

The overly restrictive assignment of the few available submarines left them in poor positions to observe or influence the American offensive. The stationary patrol lines and poor attention to operational security left the Japanese submarines highly vulnerable to a concerted effort like that conducted by the *England*. The Sixth (Submarine) Fleet again failed to commit all available submarines to a major operation by continuing the

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<sup>167</sup>Polmar and Carpenter, 47; Prados, 564.

<sup>168</sup>Prados, 564.



ceaseless supply operations and other peripheral actions. The inconsiderate deployment of submarines cost the Sixth (Submarine) Fleet numerous submarines that were sorely needed prior to the major American attacks against the Marianas and the Philippines.

### The Marianas Islands and Philippine Sea

Based on the alignment of the aforementioned scouting line, the Japanese expected the next American thrust to be directed into the Philippine Sea from the south. As American airpower started to attack the islands of Saipan, Tinian, and Guam from the east, the Japanese believed the assault to merely be a feint and initially only committed 3 RO-class submarines to the area. In comparison, the American effort included 28 submarines for various duties. As the magnitude of the assault became apparent to the Japanese Naval Staff, all available submarines were rushed to the area.<sup>169</sup>

The movement of seventeen more submarines was conducted in a piecemeal fashion due to the disparate placement and status of Japanese assets. Submarines were shifted from lower priority efforts as well as being pulled out of refit and shipyard periods to be rushed to the battle. It took five days for the first submarine to arrive. After eight days, five more submarines were on station bringing the total force to nine. By the end of the tenth day, nineteen submarines were committed. The final submarine arrived on the eleventh day. The twenty submarines were deployed in a line positioned over 300 nautical miles east of the Marianas Island chain. This placement effectively put all of the submarines out of the fight. In the end, these twenty submarines had no sinkings during the course of the battle. The boats were unable to provide actionable intelligence or

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<sup>169</sup>Polmar and Carpenter, 47.

directly counter the American attack. Employment of the submarines was hampered by the attacks on Saipan which ultimately required the command of the Sixth (Submarine) Fleet to be temporarily transferred to the commander of Squadron 7 at Truk.<sup>170</sup>

Within two weeks of the deployment of all twenty submarines, nine would be sunk and most of the others would be pressed into supply and evacuation duties. Thirteen of the twenty would be lost by the end of the battles. As American pressure on Saipan grew, *I-10* was tasked with evacuation Takagi and members of the Sixth (Submarine) Fleet staff. *I-10* was sunk attempting the evacuation and *I-38* was next to receive the same orders. After multiple attempts to retrieve the Admiral, *I-38* was unable to safely avoid the American anti-submarine effort. Orders to continue to attempt the evacuation were cancelled. Admiral Takagi and his staff perished in the final *banzai* charge in defense of Saipan. *I-41* had the lone successful act by a submarine during the attacks on the Marianas Islands. *I-41* managed to evacuate 106 aviators from Guam making them available for further operations.<sup>171</sup>

The limited number of submarines used in the initial scouting lines coupled with their restrictive positioning kept the Japanese from being able to observe the movements of the American task forces. As such, insufficient submarines were positioned in the area where the Americans attacked. The disparate employment of available submarines significantly delayed the commitment of forces to stem the American invasion. Based on the singularity of the submarine force as a roadblock to the American advance, it is incomprehensible that anything less than the full complement of available submarines

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<sup>170</sup>Prados, 564-565; Polmar and Carpenter, 47-48.

<sup>171</sup>Polmar and Carpenter, 48; Prados, 565.

was made available to the effort. The secondary status of the submarine force still allowed assets to be drawn off by peripheral requirements and tasks regardless of the actual focus of the Sixth (Submarine) Fleet.

After the loss of the Marianas Islands, the Sixth (Submarine) Fleet sent submarines to attempt to interdict the transports and cargo ships sent with engineering forces and supplies to build facilities on Saipan, Tinian, and Guam. The patrols were ineffective at delaying the improvements on the islands. No ships were sunk and four submarines were lost in the attempts. Similarly, a number of patrols were sent to the large American anchorages at Ulithi and Peleliu. Again, no sinkings were registered by these efforts but two more submarines were lost.<sup>172</sup>

The staggering losses over the course of 1944 left the Japanese submarine force with 51 operational boats at the beginning of October after starting the year with 66. While the loss of fifteen submarines may not seem significant, the composition of the force changed dramatically. The number of large I-class submarines dropped to 28 from 42 while the smaller RO and HA-class submarines numbered only fifteen after starting the year at 24. The remaining eight submarines available at the beginning of October 1944 were supply submarines that were incapable of offensive or defensive operations due to their lack of torpedo tubes. The contraction of the submarine force left only fourteen submarines available to defend against the next major American thrust.<sup>173</sup>

As submarines were rushed to the vicinity of the Philippines, the Naval Staff pressed for as many radar-equipped submarines as possible to attempt to increase the

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<sup>172</sup>Polmar and Carpenter, 48.

<sup>173</sup>Polmar and Carpenter, 49; Appendix A.

effectiveness of the force. Fourteen submarines were available for defense of the Philippines from invasion. Much like the results in defense of the Marianas Islands, the submarine had little influence on the rate of American advance. Half of the submarines committed to the effort were lost. Three of these were sunk on a single day--23 October. Five days later another submarine was lost. The next loss occurred on 12 November, and it was followed by further sinkings on 18 and 19 November. Despite the continuous losses, the submarines continued to conduct attacks and they were able to have some very minor successes. The Japanese submarines recorded only one sinking: a destroyer escort. Three ships were damaged: an escort carrier (CVE), a tank landing ship (LST) and a light cruiser (CL).<sup>174</sup>

Ironically, the ineffectiveness of the Japanese submarines in the Marianas and Philippine Islands was indirectly caused by the success of American submarines. Japanese carrier airpower was severely limited in these battles due to prior losses and distant basing. The distant basing, in Tawi Tawi, was due to the success of the American submarines in interdicting oil shipments from Borneo. Basing in Tawi Tawi put the Japanese carriers close to the oil supplies in Borneo but kept them distant from the center of the American movements.<sup>175</sup>

The losses in the Philippines decreased the Japanese submarine force to a year-end strength of 51. While this is the same strength as at the beginning of October, the composition had changed dramatically again. The large I-class submarines had been whittled down to a year end strength of 21. The medium RO- and HA-class submarines

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<sup>174</sup>Polmar and Carpenter, 49.

<sup>175</sup>Ibid., 47.

accounted for sixteen of the total force. The supply submarines had grown to a total of fourteen to form the balance of the force.<sup>176</sup>

### Drastic Measures

The large losses in June 1944 while fighting in the Marianas were the tipping point for the institution of drastic measures. The development, building and deployment of *kaiten* suicide torpedoes rose to a priority position. Almost all submarines, supply transports included, were modified for the purpose of carrying *kaiten*. Originally designed so that the operator could “~~ject~~” himself from the weapon prior to impact, the employment of these weapons was advanced with no intention of recovery of the pilots as Japanese losses and setbacks continued to mount. *Kaiten*-carrying submarines were formulated into the final defense plan as the first line of defense of the Home Islands. Having already started kamikaze attacks with aircraft, the step to suicide torpedoes was a short one.<sup>177</sup>

The move to *kaiten* use was not without merit when the overall state of the Japanese submarine force, and of the Pacific war, is taken into account. The Japanese submarine force had suffered heavy losses with little accomplished. Inexperienced crews were being sent to combat without the opportunity to conduct “~~warmup~~” patrols in the Indian Ocean and other less challenging areas. The lack of resources was taking its toll on production capacity as material was expended on massive submarines that had little

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<sup>176</sup>Appendix A.

<sup>177</sup>D.M. Giangreco, *Hell to Pay: Operation DOWNFALL and the Invasion of Japan, 1945-1947* (Annapolis, MD: Naval Institute Press, 2009), 6, 19; Hashimoto, 177; Polmar and Carpenter, 54, 137.

chance for influential operations. Small *kaiten*, *kairyu* and *koryu* submarines could be built en masse within the confines of the limited resources. The “guided” nature of these weapons also provided the opportunity to increase the effectiveness of Japanese attacks by focusing on key targets in a convoy or battle group.<sup>178</sup>

The first *kaiten* operation (*Kikumizu*) occurred in November 1944 by a force comprised of the *I-36*, *I-37* and *I-47* each carrying four *kaiten*. The target of the attack was the American anchorage at Ulithi and nearby passages. Of the twelve *kaiten* carried, only five were launched. *I-47* launched all four at the anchorage while *I-36* was only able to launch one due to mechanical issues. *I-37* was sunk before being able to act. The returning commanders claimed the sinking of three aircraft carriers and two battleships for the five *kaiten* that were launched. The Navy staff reveled in the overwhelming success of the attack and promptly ordered further *kaiten* missions. Unfortunately, for the Japanese, the actual result of these attacks simply traded the lost *I-37* for the sinking of a single American oiler (AO).<sup>179</sup>

Believing that the *Kikumizu* mission was highly successful, the second *kaiten* operation (*Kongo*) took place in January 1945 and consisted of six submarines each carrying four *kaiten*. The six submarines were assigned five separate targets including Ulithi and Guam. Mechanical issues and American ASW efforts impacted the total number of *kaiten* that were launched. Three submarines launched all four *kaiten*, one launched two, one failed to launch any while the final submarine was sunk and did not return. The Navy staff did assume however that all four *kaiten* were launched against the

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<sup>178</sup>Polmar and Carpenter, 54-55.

<sup>179</sup>Prados, 707; Polmar and Carpenter, 51-52; Hashimoto, 177-178.

planned target before the submarine was sunk. Based on the “perfect” five sinking for five *kaiten* results of *Kikumizu* and optimistic reports from the returning submarine commanders, the Navy staff assumed eighteen sinkings for the eighteen *kaiten* employed. Postwar analysis indicated no sinkings as a result of the *Kongo* operation.<sup>180</sup>

A third *kaiten* mission (*Chihaya*) was hastily organized in February 1945 to attempt to repulse the American invasion of Iwo Jima. Three submarines were organized for this effort, two of which (*I-368* and *I-370*) were supply submarines converted to carry *kaiten*. The operation continued the trend of poor results. No ships were sunk, and two submarines were lost. The third submarine was effectively frustrated by American anti-submarine efforts and was unable to launch any *kaiten*.<sup>181</sup> The tally at the end of three *kaiten* operations was four submarines lost for the sinking of a single American oiler. The Navy staff, however, was confident that every *kaiten* launched had sunk a ship and that the losses had bought the sinking of 23 American capital ships.

The next *kaiten* mission (*Kamitake*) was organized to replace the fruitless *Chihaya* operation. Two boats were assigned, but neither launched a *kaiten*. *I-36* returned without result due to mechanical issues while *I-58* had its orders cancelled. *I-58* was subsequently ordered to operate as a radio beacon for a flying boat raid on Ulithi. The cancellation of orders and redirection of *I-58* forced the boat to retrace its steps after having penetrated the anchorages near Iwo Jima. *I-58* had actually manned its *kaiten* and was within an hour of engaging a number of targets when diverted. The subsequent air

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<sup>180</sup>Prados, 707; Hashimoto, 179; Polmar and Carpenter, 55-56.

<sup>181</sup>Hashimoto, 194-195; Polmar and Carpenter, 56.

raid on Ulithi was ineffective at inflicting significant damage on the American Fleet and *I-58* was ordered home with nothing to show for its patrol.<sup>182</sup>

The fifth *kaiten* operation (*Tatara*) was the first major attempt by the Japanese submarine force to influence the American invasion of Okinawa. Four submarines carrying twenty *kaiten* torpedoes were tasked in the operation. Two submarines, *I-44* and *I-56* were sunk while *I-47* returned home due to excessive damage. *I-58* was the sole submarine in the group not damaged or sunk. *I-58* had been unable to close the anchorage due to heavy weather and American air patrols. *I-58* had been tasked with joining a surface group, including the battleship *Yamato*, and conducting a coordinated attack. By the time *I-58* was able to close range, the American carrier planes had decimated the surface group. *I-58* would ultimately be ordered home without a victory or employing a single *kaiten*. Thus, *Tatara* ended with no sinkings for two losses.<sup>183</sup>

Up to this point, submarines carrying *kaiten* had been under strict orders to maintain radio silence until after their attacks were complete. The boats were also directed to forego torpedo attacks on other vessels before the assigned *kaiten* operations to avoid alerting American forces to the presence of submarines. Some commanders further interpreted their orders as requiring them to conduct no other attacks outside the *kaiten* operation. Thus, the significant desire for operational security to improve the chance of success for the *kaitens* limited the offensive capability of the submarines numerous times in this critical closing stage of the war. The submarines were relegated to

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<sup>182</sup>Hashimoto, 196-198; Polmar and Carpenter, 57.

<sup>183</sup>Hashimoto, 203-204, 206-207; Polmar and Carpenter, 58.



a role as a transport for *kaiten*. This situation focused on the diminished experience of the submarine crews.<sup>184</sup>

In May 1945, VAdm Tadashigo Daigo took command of the Sixth (Submarine) Fleet. The focus of the submarine force and its *kaiten* operations was shifted away from the area of the invasion and the majority of the American combatants. American supply routes well behind the lines were the target. Along with the change in focus came a change in tactics. No longer would the submarines be constrained in their ability to attack outside of using *kaiten*. The *kaiten* were also targeted on moving ships at sea vice stationary ships in protected anchorages.<sup>185</sup>

The *sixth* kaiten operation (*Tembu*) involved two submarines carrying twelve total *kaiten*. *I-36* launched four *kaiten* against convoys and reported four sinkings. Post war review of records shows no sinkings that match *I-36*'s *kaiten* attacks. *I-47* attacked a convoy with four torpedoes for no sinkings. *I-47* also attempted attacks with four *kaiten* the following day. Again there were no sinkings and only slight damage to a cargo ship. The two following kaiten operations (*Shimbu* and *Todoroki*) had five submarines carrying 23 *kaiten*. Ultimately, only four *kaiten* were launched for no sinkings. Two submarines were lost and a third was heavily damaged.<sup>186</sup>

The final kaiten operation (*Tamon*) involved six submarines carrying 35 *kaiten*. Only three of the submarines, with sixteen of the *kaiten*, would return to Japan. This would be the only kaiten operation, other than *Kikumizu*, that would result in a sinking.

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<sup>184</sup>Hashimoto, 195, 198, 207.

<sup>185</sup>Hashimoto, 209-210; Polmar and Carpenter, 59.

<sup>186</sup>Polmar and Carpenter, 59-60.

The group would claim seven sinkings. The *I-53* launched two *kaiten* to sink the American destroyer escort USS *Underhill* (DE). This would be the last vessel sunk by *kaiten* during the war. During the remainder of operation, a transport would be damaged off Okinawa and the Japanese would sink their last major American combatant. Both successes would use torpedoes instead of *kaiten*.<sup>187</sup>

The submarine *I-58* departed Japan on 18 July 1945 carrying six *kaiten* in order to conduct attacks on shipping east of Philippines as part of the operation named *Tamon*. *I-58* conducted numerous attacks during the patrol using both torpedoes and *kaiten*. Only one attack was successful. Observing a large warship one night, Commander Hashimoto chose to fire a salvo of six torpedoes instead of employing any of the *kaiten* that he carried. The choice to use the torpedoes was based on time of day and visibility. The victim of the attack was the American heavy cruiser USS *Indianapolis* at sea after delivering atomic bomb parts to Tinian.<sup>188</sup>

After nine *kaiten* operations to attempt to influence the American invasions of the Philippines, Iwo Jima, and Okinawa, the Japanese submarine force had very little tangible results. Eight submarines were lost during these operations while only managing to sink an oiler and a destroyer escort with *kaiten*. A small handful of other ships were also damaged. The *kaiten* were ineffective at generating more sinkings whether they were employed in anchorages or open ocean.<sup>189</sup>

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<sup>187</sup>Ibid., 61.

<sup>188</sup>Hashimoto, 214, 217, 223-224.

<sup>189</sup>Hashimoto, 209-210; Polmar and Carpenter, 63.

The wholesale focus on *kaiten* employment as the final thrust of the submarine force to challenge the American offensive indicated the serious deficiencies that the submarine force was trying to overcome. The inexperience of replacement crews combined with the small number of submarines available for operations drove the use of *kaiten*. The strength of American forces combined with the haphazard and restrictive employment of the submarines confined them to limited results and numerous losses.

### Conclusions of the Late War Period

The Japanese submarine force found itself struggling to make the necessary impact as the American fleet drove through the South Pacific in to the Central Pacific. The submarine force found itself stretched as boats continued to be committed to areas well outside the focal point of the American operations. The submarines committed to the Indian Ocean and the Aleutian Islands drew vital assets away from the Pacific area of operations. The lack of assets was exacerbated by their restrictive employment and lack of concern for operational security. The submarine force was challenged in these circumstances to provide effective scouting and early warning without even considering actually conducting attacks.

The loss of submarines drove the Sixth (Submarine) Fleet staff to rearrange their method of employment of the submarines. Unfortunately, the decreased level of experience of the submarine crews late in the war was not conducive to the freedom of operation provided by using patrol areas. Previous lack of concern for operational security combined with inexperience in the more freely flowing operations away from scouting lines only combined to increase the number of losses without coincident increase in sinkings. While the overly restrictive scouting line alignment of forces

negated the majority of the submarine's unique capabilities, the shift to patrol areas failed to consider the lack of experience from both a submarine and staff standpoint. The shift came too late to build requisite knowledge and capitalize on the strengths of the submarines. The rigid Japanese command and control system ensured that the submarines were unable to exercise the full breadth of their capabilities while it was in place, but further, it caused the force to not have the experience necessary to succeed in the decentralized environment..

Once the decision was made to employ *kaiten* was made, the submarine force finally decided to employ proper concern for operational security and subsequently hampered the effectiveness of the submarines sent out on successive operations. Even though the desire to protect the limited number of submarines that remained in operation was commendable, the staff failed to allow the submarines the freedom they needed in the initial *kaiten* operations to have an influence. The example of *I-58* passing up numerous targets during *Kamitake* and *Tatara* and then scoring a victory during *Tamon*, once restrictions were removed, stands as a microcosm of the impact of the restrictive orders. Even with the change in weaponry, the ineffective method of controlling operations continued to influence the operational result.

For all of the positive changes that were ultimately made in the waning months of the war to ease the restrictions on submarines, the result had already been cast. The submarine force was too small to have an influence. The effectiveness was limited by the decreased capability as the percentage of transport submarines in the force rose. The resources devoted to transports and large submarines kept the faster *Sen Taka Sho* type submarines from reaching the fleet in numbers to return the advantage to submarines

from the anti-submarine forces. The regular shifting of the submarine force's strategic and operational focus kept the commanders in a state of confusion about how to conduct each successive patrol. The regular changes also challenged the staff to effectively deploy the submarines for maximum influence.

## CHAPTER 6

### CONCLUSIONS

The Japanese submarine force was a highly capable organization with abundant potential at the outset of World War II. The force consisted of highly capable submarines and well-trained crews. The failure of the force to have the expected influence was based on a combination of poor planning, misguided employment and inexperienced senior commanders.

The remainder of this thesis will review the inherent capabilities and advantages of the Japanese submarine force in World War II. The characteristics and issues that undermined the core of the power of the Japanese submarine force will then be reviewed. A final review of the numerous missed opportunities and failures will follow. A summary of the major conclusions and recommendation for further research will complete the thesis.

#### The Case for Japanese Power

The submarines of the Japanese Navy consisted of some of the most capable in the world at the beginning of World War II. All the submarines built from the outset for operations in the war significantly outranged the submarines of the Allies navies. The range advantage provided the ability to operate at extreme distance from home port or maintain a long on-station time in a given area. Subsequently, the Japanese were able to apply their influence further and longer than other submarine forces. Along with the superior operational reach of the submarines, excellent torpedoes were provided that had a long range and powerful warheads.

The Japanese technological advantage did not wane during the course of the war. It diverged to three different branches: large, small, and fast. The Japanese used their skill to build the largest submarines in the world (*Sen Toku* Type) as well as some of the most capable small submarines (*kaiten* and other midgets). Most impressive of all of their designs, however, is the *Sen Taka Sho* Type medium attack submarine that had an acceptable cruising range coupled with outstanding underwater speed. Had more of these submarines reached operational status earlier, the American forces would have had a unique foe on their hands.

Even with the technological advantages of their designs, the Japanese submarines did suffer from a lack of resources that placed limits on the number of submarines that could be built and on the timeliness of the build process. Also, the Japanese did have a significant delay in developing and installing radar on their submarines. While it was a deficiency, based on the evidence and analysis in this monograph, it would not have had significant influence if the focus on operational security had been stronger.

The training of Japanese submarine crews was without equal. The submarines spent long periods of time out at sea constantly practicing elements of the plan for a decisive battle. The intense training periods had such a level of realism that three submarines were lost in prewar training accidents. The training was not without fault however. The overarching focus on the submarine role in the “decisive battle” limited the growth of submarine force capabilities. The overall training gave minimal consideration to key aspects of submarine operations: surveillance, commerce raiding, and sea control (area denial).

### Seeds of Failure

Numerous items brought about the failure of the Japanese submarine force including senior staff experience, basic planning failures, a rigid command and control structure, and an overwhelming failure to learn. The numerous commanders of the Sixth (Submarine) Fleet had little experience in submarines. Admiral Suetsugu, the architect of Japanese submarine involvement in the “decisive battle,” had no submarine experience. Only late in the war did an actual submarine officer rise to take command of the Sixth (Submarine) Fleet. The lack of experience of the fleet commander gave little opportunity to challenge the General Staff’s desire to employ the submarines as an adjunct to the surface forces instead of pushing for independent operations or assignment to roles that maximized use of their capabilities. In essence, there was no champion of the submarine force to counter the desires of the surface admirals. The early commanders were willing to accept the secondary and unsatisfactory roles that submarines were assigned with each successive battle. Once an experienced submariner did take command of the fleet, the force was weaker in both vessels and experience. Coupled with the overall poor health of the Imperial Japanese Navy, there was little opportunity for the submarine force to capitalize on the advantage of having a knowledgeable commander.

The submarine force also suffered under a number of basic planning failures. The planners of operation after operation failed to develop alternatives to the ideas proposed by the commander. Midway stands as a prime example. The commitment of a number of submarines to support the aborted K Operation for reconnaissance of Pearl Harbor removed numerous vessels from the scouting lines. A scouting submarine with an aircraft could have conducted the operation alone allowing the other available submarines to



form scouting lines earlier giving a higher probability of detecting the American carriers and changing the face of the battle. The planners also failed to develop contingency plans based on expected events. The cordon around Pearl Harbor in early December 1941 provides the example. Once an American aircraft carrier was sighted, a large part of the cordon was dispatched for the chase. There was no plan to shift units to cover the gap or bring further units to the area to replace the departed. Instead, the cordon was left open and the dispatched units were haphazardly sent to the American West Coast to patrol. At Midway, Guadalcanal, and later, scouting lines were shifted in hurried and inconsistent manners late in the battles robbing the submarine force of the ability to make further contributions. Time and again, the planners failed to consider anything other than what was envisioned as the perfect execution of the plan.

The rigid command and control structure and subsequent lack of operational security also cost the Japanese submarine force assets and initiative in numerous operations. The rigid assignment of submarines to inflexible scouting lines made the submarines incapable of completing the simplest task of early warning because they were tied to specific geographic points and spaced to far apart to provide overlapping fields of view to spot encroaching forces. The strict control of operations from distant headquarters delayed the ability of the submarines to react to changes in the battle. The need for greater communications to execute this form of command and control placed the submarines at risk of location by Allied forces. The risk was fully realized during the *England's* streak of sinkings, but it was also a factor in number of other losses. The end result was not too dissimilar from the Allied forces' actions against German U-boats in the Atlantic because of Doenitz's communication requirements.

The final, and most perplexing, failure of the Japanese submarine force was its inability to learn and adapt to the conduct of the war. From Pearl Harbor through the operations in the Marianas in 1944, Japanese submarines were employed in rigid scouting lines and consistently failed to intercept and report on American fleet movements. Not until the force had suffered the loss of even more submarines in the Marianas did the staff shift their employment to patrol areas where the boats would be able to more freely search for targets. That late in the war, the shift was meaningless. Because the force was so decimated, there were not sufficient boats available to mount a solid defense of the Philippines. The employment of scouting lines failed in every instance that it had been used. The lines were not maintained intact around Pearl Harbor to maintain the cordon. They were late to take station and then moved without an overriding plan or effect at Midway. They were haphazardly strung around the Solomons, Gilberts, Marshalls and Marianas and shifted without operational thought. Only late in the war were submarines released to freely stalk for prey. At this point the force size was too small to have any influence. Submarines were regularly removed from offensive or defensive operations to support grandiose airborne reconnaissance or nuisance strike missions. Submarines were committed *en masse* to both K Operations as well as reconnaissance and strike flights over Ulithi. The bombings had little effect. The support of reconnaissance missions, by acting as refueling platforms or navigational aids, discounted the ability of the submarines to do the jobs themselves. The submarine force had provided the first photographic intelligence of the results of Pearl Harbor as well as prescient intelligence of preparations at Midway, but the opportunity for later use of submarines as the primary operator in this key role was ignored.

### Missed Opportunities

Based on the mystique of the German Submarine Force and the results of the American Submarine Force, it would be easy to jump to the idea that had the Japanese Submarine Force strictly applied a strategy of commerce raiding it would have had a greater impact on the war in the Pacific. This argument is too simplistic and discounts the enemy that each respective country was targeting. Japan and Britain, as targets of America and Germany respectively, were island countries dependent on long lines of communication for necessary resources and forces to fight the war. These lines were vulnerable to the focus of intense submarine efforts. Both America (in the Pacific) and Germany were also faced with the lack of a strong surface fleet to conduct offensive operations. The Germans were held in port by a combination of factors, and the American Pacific Fleet was attempting to rebuild after Pearl Harbor. As such, commerce raiding against fragile lines of communication was their only recourse.

The Japanese faced a far different situation at the outset of the war. They had built a large fleet focused on a single strategy. They had a single opponent to be concerned with and that same opponent did not have the immediate ability to attack their nation. The Pacific Ocean provided a strategic safety buffer from American forces. The surprise attack on Pearl Harbor reduced the effective combat power of the American Fleet and put them immediately in a defensive posture. The American Navy was not altogether prepared to face the Japanese and an early focus on commerce raiding would have not been able to have an influence similar to that which the American submarines achieved. The Japanese, for all of their superiority in submarine technology, would not have been able to influence the American East Coast. While forces could be moved to act against

the West Coast, the force size was too small to carry out effective operations to limit commerce or other operations on the East Coast. Further, there was no method to influence the natural resources available in America proper.

While the focus on a single decisive battle that was unattainable was short-sighted, the understanding that the Japanese Navy needed to focus on American military strength was not improper. The submarine force, as well as the rest of the Navy, was constructed for naval engagement not commerce raiding. The true failure of the force was not to focus its efforts on the opportunities that presented themselves. Pearl Harbor, Midway and Guadalcanal all presented themselves as opportunities for potentially decisive actions. In all three actions, the number of American aircraft carriers available in the Pacific was limited and the ability of the American Navy to conduct continued combat operations was at risk. The Japanese submarine force, based on direction from the Navy Staff, scattered its units to various other theaters away from the major battles, mainly the Aleutians and Indian Ocean.

Had the Japanese submarine force maintained the full cordon around Pearl Harbor after the 7 December attack, they could have effectively maintained ten or more submarines on station continuously when based out of Kwajalein. The size of the Japanese submarine force (capitalizing on significant operational range of the large designs) could have significantly slowed the resupply and rebuilding of Pearl Harbor and denied the American Navy its last key strategic outpost in the Pacific forcing them to extend their lines of communication and operation for any effort against the Japanese a few thousand more miles all the way back to the American West Coast. American operations from the West Coast would have been more vulnerable to the Japanese fleet.

An effective blockade of Pearl Harbor had the potential to expose it to an amphibious invasion which would have further challenged the American ability to recover from the initial attacks and generate offensive initiative.

Had the Japanese submarine force applied the principles of mass and unity of effort to their employment of forces at Midway and Guadalcanal, the operational submarine units in the areas of these battles would have been tripled posing a far greater risk to the American forces. The larger number of units at Midway would have increased the opportunity of early detection of American forces, specifically the aircraft carriers, potentially allowing the Japanese carriers to focus their effort against the American task forces prior to attacking Midway proper. This employment would have more closely met the training that the submarine force underwent during the interwar period potentially raising effectiveness as well.

The Japanese submarine force continued to deny the principle of mass in operations during the American invasion of Guadalcanal. Submarines were still deployed to various marginally important areas rather than the area of Guadalcanal. The small number of submarines assigned to the Guadalcanal area was further diverted from the potential decisive battle by being tasked to conduct supply operations instead of attempting to thwart the invasion and buildup. The respect shown by the American forces for the submarine threat could have been taken advantage of by a larger effort focused on them. Instead, the opportunity to stall the American advance in the South Pacific was given little direct attention while effort was applied to meaningless supply operations and Aleutian and Indian Ocean excursions.

Even as the opportunity for the handful of critical battles passed and the Japanese were placed firmly on the defensive, proper employment of the submarines could have still brought considerable results. The Japanese submarine force consistently showed the ability to complete complicated approaches and attack challenging targets. The sinking of *Yorktown* at Midway and *Wasp* at Guadalcanal are proof that the prewar training and exercise experience developed a skilled force that could find success in operations against a determined opponent. Had the Japanese focused their effort against the American offensive, the submarine force had the ability to influence operations. Unfortunate choices to hinder the submarines' tactical freedom limited their influence as the Americans advanced through the Central and Western Pacific.

### Conclusion

The Japanese submarine force was undoubtedly a technologically superior force at the outset of the war. They were highly trained and well organized to support a distinct form of battle. The training and experience gained in interwar exercises provided a force that was ready to directly face the American Navy. The planning and execution of the war strategy failed to capitalize on the specific skill set of the submarines that were available. Had the submarines been employed as anything more than an adjunct force supporting other efforts, they could have exerted a strong influence and produced costly losses for the American Navy opening the Pacific to further Japanese operations.

The Japanese submarine force was uniquely prepared for operations against enemy combatants and did not need to resort to commerce raiding to have an influence. In fact the early successes of the Japanese Navy made commerce raiding unnecessary. Unfortunately, the Japanese did not capitalize on early successes by maintaining their

forces forward and massed for further strikes against American forces. Once the paradigm of the Pacific War changed to a protracted conflict with American forces operating on extended lines of communication, the Japanese failed to adjust their employment strategy and shift to concerted commerce raiding efforts. The failure to learn from the experiences of the German and American submarines as the face of war changed left the Japanese unprepared to have any influence as the war came to an end.

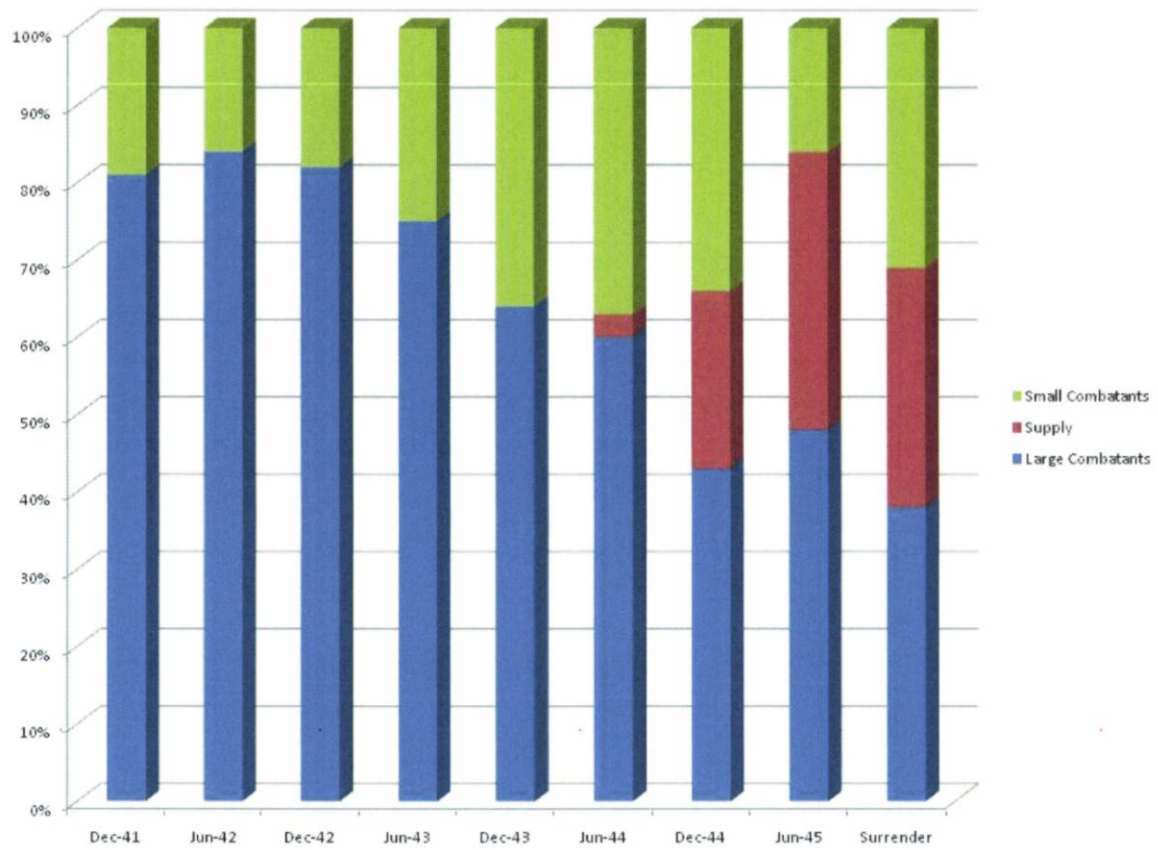
Properly employed, the Japanese submarine force could have been the key to a very different war. Instead, their misemployment only aided in allowing the quick rebuilding of American forces due to their industrial dominance. As such, the actions of Japanese submarines only became footnotes to most major naval battles in the Pacific Ocean.

#### Further Research

A number of different opportunities for further research arose during the course of this thesis. Detailed analysis of the submarine training program both interwar and during the war provides the opportunity for understanding the influence it had on the tactical successes and failures of the force. Investigation of the Japanese shipbuilding industry could provide insight into influences on the composition of the submarine force.

## APPENDIX A

### EVOLUTION OF IJN SUBMARINE FORCE COMPOSITION





## BIBLIOGRAPHY

### Archival Material

–US Submarine War Patrol Reports, 1941-1945 (microfilm).” US Navy, 1947.

### Books

#### Primary Sources

Doenitz, Karl. *Memoirs: Ten Years and Twenty Days*. Translated by R. H. Stevens. London: Weidenfeld and Nicolson, 1959.

Fluckey, Eugene. *Thunder Below*. Chicago: University of Illinois Press, 1992.

Hashimoto, Mochitsura. *Sunk: The Story of the Japanese Submarine Fleet, 1941-1945*. Translated by E. H. M. Colgrave, RN. New York: Henry Holt and Co, 1954.

Lockwood, Charles. *Sink ‘Em All: Submarine Warfare in the Pacific*. New York: E. P. Dutton and Co, 1951.

Orita, Zenji and Joseph D Harrington. *I-Boat Captain*. Canoga Park, CA: Major Books, 1976.

Sakamaki, Kazuo. *I Attacked Pearl Harbor*. Translated by Toru Matsumoto. New York: Association Press, 1949.

Schratz, Paul. *Submarine Commander*. Lexington, KY: University Press of Kentucky, 1988.

Ugaki, Matome. *Fading Victory: The Diary of Admiral Matome Ugaki, 1941-1945*. Translated by Masataka Chihaya et al. Pittsburgh: University of Pittsburgh Press, 1991.

#### Secondary Sources

### Books

Asada, Sadao. *From Mahan to Pearl Harbor: The Imperial Japanese Navy and the United States*. Annapolis, MD: Naval Institute Press, 2006.

Bagnasco, Emilio. *Submarines of World War Two*. Annapolis, MD: Naval Institute Press, 1973.

Blair, Clay. *Silent Victory*. New York: J. B. Lippincot Company, 1975.

- . *U-Boat Wars: The Hunters 1939-1942*. New York: Random House Publishers, 1996.
- . *U-Boat Wars: The Hunted: 1942-1945*. New York: Random House Publishers, 1998.
- Boyd, , and Akihiko Yoshida. *The Japanese Submarine Force and World War II*. Annapolis, MD: Naval Institute Press, 1995.
- Compton-Hall, Richard. *Submarine Warfare: Monsters and Midgets*. Dorset: Blandford Press, 1985.
- Cook, Haruko Taya, and Theodore F Cook. *Japan at War: An Oral History*. New York: New Press, 1992.
- Evans, David C., and Mark R. Peattie. *Kaigun: Strategy, Tactics and Technology in the Imperial Japanese Navy, 1887-1941*. Annapolis, MD: Naval Institute Press, 1997.
- Friedman, Norman. *Submarine Design and Development*. Annapolis, MD: Naval Institute Press, 1984.
- Gabler, Ulrich. *Submarine Design*. Koblenz: Bernard and Graefe Verlag, 1986.
- Gannon, Michael. *Operation Drumbeat*. New York: Harper and Row Publishers, 1990.
- . *Black May*. New York: Harper-Collins Publishers, 1998.
- Giangreco, D. M. *Hell to Pay: Operation DOWNFALL and the Invasion of Japan, 1945-1947*. Annapolis, MD: Naval Institute Press, 2009.
- Hadley, Michael. *U-Boats Against Canada: German Subamrines in Canadian Waters*. Montreal: McGill-Queen's University Press, 1985.
- Holwit, Joel I. *Execute Against Japan: The Decision to Conduct Unrestricted Submarine Warfare*. College Station: Texas A&M University Press, 2009.
- Keegan, John. *The Price of Admiralty: The Evolution of Naval Warfare*. New York: Viking, 1989.
- Largess, Robert P., and James L. Mandelblatt. *USS Albacore: Forerunner of the Future*. Portsmouth: Portsmouth Marine Society, 1999.
- Lowder, Hughston E., and Jack Scott. *BATFISH: The Champion Submarine Killer of World War II*. Englewood Cliffs: Prentice-Hall, 1980.
- Padfield, Peter. *War Beneath The Sea: Submarine Conflict During World War II*. New York: John Wiley and Sons, 1995.

- Parshall, Jonathan, and Anthony Tully. *Shattered Sword: The Untold Story of the Battle of Midway*. Dulles: Potomac Books, 2005.
- Peattie, Mark R. *Sunburst: The Rise of Japanese Naval Airpower, 1909-1941*. Annapolis, MD: Naval Institute Press, 2001.
- Polmar, Norman and Dorr B Carpenter. *Submarines of the Imperial Japanese Navy 1904-1945*. London: Conway Maritime Press Ltd, 1986
- Prados, John. *Combined Fleet Decoded*. New York: Random House, 1995.
- Treadwell, Terry. *Strike From Beneath The Sea: A History of Aircraft Carrying Submarines*. Gloucestershire, England: Tempus Publishing Ltd, 1999.
- Webber, Bert. *Silent Siege III: Japanese Attacks on North America in World War II—Ships Sunk, Air Raids, Bombs Dropped, Civilians Killed*. Medford, OR: Webb Research Group Publishers, 1997.
- White, John F. *U-boat Tankers, 1941-1945: Submarine Suppliers to Atlantic Wolf Packs*. Annapolis, MD: Naval Institute Press, 1998.

#### Thesis

- Farr, Scott. —The Historical Record, Strategic Decision Making, and Carrier Support to OPERATION WATCHTOWER.” Master’s Thesis, Command and General Staff College, Ft. Leavenworth, KS, June 2003.

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